A Genre-based Approach

TO ENHANCING SECONDARY STUDENTS'

English Writing Ability in Science Subjects

Teaching Manual

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Author

Dr. Graham Lock

Editor

Karoline Anderson

Contact information

Email: jack.pun@cityu.edu.hk

Website

Please visit our website to learn more about the project and download free teaching and learning materials: https://www.teachingscienceenglish.com

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Investigator

Dr. Jack Pun

Language consultant

Dr. Graham Lock

Workshop teachers

Christy Ou Shufen

Andrew Leung

Shazia Bibi

Researchers

Karoline Anderson

Xuehua Fu

Jiaqi Xu

Michael Ahmad Khan

Natasha Datta

Susan Sheung

Jolly Wong

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A Genre-based Approach
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Introduction

This manual was developed in fulfilment of the QEF funded project, *A genre-based approach to enhancing secondary students' English writing ability in science subjects*. The project implemented 12-week scientific writing intervention workshops in nine Hong Kong secondary schools to support students' scientific writing and English language skills. The outcomes of the workshops suggest that the teaching and learning materials provided herein may benefit students' independent writing and English learning capacities and increase students' English communication confidence. The workshop teaching manual has three parts, including the teaching materials, student learning materials, and corresponding PowerPoints, and is available in printed editions to be distributed throughout Hong Kong secondary schools or downloadable on the project's website, *www.teachingscienceenglish.com*. The following introduction covers:

- The merits and implementation of a genre-based pedagogy in English as a medium of instruction (EMI) classrooms
- The contents of this teaching manual
- Key approaches to effectively using the materials in the classroom

What is the genre-based pedagogy and how is it implemented in EMI science classrooms?

The genre-based pedagogy merges English language learning and scientific contexts to help students engage in the "language of science". Traditional teaching approaches isolate language and scientific learning, increasing the gap between students' scientific knowledge development and the ability to articulate knowledge in English. They also frequently divide the teaching of reading and writing skills from the presentation and practice of grammar and vocabulary (lexicogrammar), thus making it difficult for students to employ lexicogrammatical features appropriately in context. However, the genre-based pedagogy decreases these gaps through coinciding language and scientific learning and exploring the contextual functions of lexicogrammatical features while focusing on a specific genre—the scientific research report. This manual progressively guides students through the scientific research method and reporting process using English learning tools catered to articulating scientific knowledge.

Using this manual, students will accelerate their English language and scientific report writing skills through *reflection* and *strategizing* curriculum components. These components aid students with different learning needs and English levels assess their work and employ learning strategies to become self-directed learners.

Reflection components

- Using checklists to assert congruency between language features and scientific report contexts
- Identifying language challenges through reviewing scientific texts
- Peer-reviewing and revision activities

Strategizing components

- Identifying generic and lexicogrammatical features in texts (E.g., hedging, text cohesion)
- Comparing textual and lexicogrammatical features in texts
- Sequencing text elements
- Completing texts
- Rewriting texts

Reflection and strategizing language learning components are integrated throughout the teaching and learning materials and correspond to scientific investigating and report writing features. Teachers using this manual can follow the activities and discussions throughout the 12-week course material to seamlessly integrate English language and scientific learning without necessitating additional language learning preparation. The merging of language and scientific knowledge reduces learning fatigue and increases students' confidence in communicating scientific ideas in English.

What are the contents of this manual?

This manual contains teachers' notes, students' handouts, and PowerPoints. There are 12 lessons in the teaching and learning materials. Each lesson takes approximately two teaching hours and may be taught over a 12-week period, as initially intended, selectively chosen, or condensed in an intensive course. PowerPoints accompany the first nine lessons to facilitate the learning process.

Teachers' Notes

The teachers' notes are appended to the students' handouts and highlighted in red. They provide suggestions for presenting the materials, scaffolding students' responses to tasks, and providing feedback on students' writing. Suggested answers are given for tasks where appropriate. Teachers can refer to the teacher's notes to swiftly prepare for the class, execute learning procedures throughout the lesson, and implement teaching techniques to facilitate more in-depth scientific knowledge development and students' critical thinking.

Student's Handouts

Students are progressively introduced to different aspects of scientific investigation and report writing throughout the 12 lessons. The individual lessons include samples of scientific report writing, tasks to encourage the students to explore the generic and lexicogrammatical features in the texts, and tasks to enable students to practice writing using the relevant textual and lexicogrammatical features.

PowerPoint learning tool

The manual additionally provides PowerPoints to supplement the instruction of lessons 1 through 9. The PowerPoints help deliver the curriculum content and engage students during the lessons, as well as contain videos, photos, or texts pertaining to the lessons. This teaching tool may be used with the learning materials during in-class or online instruction.

For more information, visit the *PowerPoint tutorial QR codes* section of this manual to access PowerPoint instruction videos. These videos demonstrate the integration of the PowerPoint teaching tools in classroom instruction.

Lesson 1 introduces students to the scientific method, hypothesis development, and key terms used to report scientific investigations.

Lessons 2 and 3 instruct students on developing a research project. These lessons are separated into three topics of investigation: Multitasking, Effects of Music, and Laughter and Mood. Students join groups to learn about their research investigation topics before independent report writing.

Lesson 4 explores the typical sections of a scientific report (introduction, method, results, discussion, and conclusion), their communicative purposes, and their sequencing.

Lessons 5 and 6 explore the language and content of the *introduction* section and prepare students to write the first draft of the introduction to their reports.

Lesson 7 explores the language and content of research report *method* sections and prepares students to write the first draft of their method sections.

Lesson 8 explores the language and content of research report *results* sections and prepares students to write the first draft of their results sections.

Lesson 9 explores the language and content of the research report discussion and conclusion sections and prepares students to write the first draft of their discussion and conclusion sections.

Lessons 10 through 12 guide the students in re-drafting the five sections of their reports to form a complete and coherent research report.

What key teaching and learning approaches are used in this course?

Noticing, exploring, and practising

At the beginning of most lessons, students are given sample texts paired with vocabulary exercises that model the kinds of writing required in the different sections of a research report. Through various tasks, the students are guided to notice characteristic features of these texts, explore the functions in the context of these features, and practise writing similar texts of their own.

Discussion, collaboration, and peer evaluation

The students are encouraged to work together in groups throughout the course. They are guided to discuss their group responses to noticing and exploration tasks, to collaborate in carrying out the research projects and preparing their reports, and to give evaluative feedback on one another's draft texts.

Drafting and re-drafting

Students are guided to draft and redraft the texts that eventually form the various sections of their individual research reports. This process includes responding to comments and suggestions from their classmates and the teacher, giving feedback on their classmates' drafts, and editing their own drafts.

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Genre-based Approach to Enhancing Secondary Students' English Writing Ability in Science Subjects

Teachers' Notes

City University of Hong Kong, Department of English
&
Quality Education Fund

QEF project no. 2017/0884

Lesson 1: What is scientific research?

Introduction

Through this course, you will be learning how to write like scientists, which means that you will also be learning something about how to be scientists. You will do some research using scientific methods and afterwards write a report on what you did and what you found. In this first lesson, we will consider what "scientific research" means, by exploring some key words and ideas.

NOTE: At various places in these lessons, you will see a Vocabulary Preparation box. The exercises in each box ask you to match words with their meanings by looking at how the words are used. This should give you some useful practice in working out the meanings of words from context. You may also find that you are more likely to remember words you have learned in this way, than by, for example, simply looking them up in a dictionary.

This first lesson aims to familiarise students not only with some key words and ideas that will be used throughout this course, but also with the format of the lessons and with what will be expected of them as students. In particular, it encourages them to work in groups to discuss various questions, as well as to share their written work and to comment on one another's work.

How this is managed will of course depend on school policy and the classroom culture. In principle, as this is a course focussing on writing in English, there is no reason why some or all of the group discussion should not be in the students' mother tongue.

The students will need a way of sharing drafts of what they write, both with the teacher and with their fellow students. In the trials of this course, Google Docs was found to be a very convenient way of doing this. To use Google Docs the students will, of course, need to be able to go online in the classroom. Several schools in the trial provided the students with iPads or similar, but in fact many students seemed to prefer using their own smart phones. If this is not possible, the students can of course simply exchange handwritten drafts, but this will make it more difficult to for them to comment on one another's drafts and to rewrite them as many times as may be necessary.

VOCABULARY PREPARATION

Having the students first skim through the texts and focus on vocabulary before doing the tasks seemed to work better in the trials than either having vocabulary lists after each text or having a vocabulary list at the end of each lesson. However, different teachers may have their own preferred ways of dealing with vocabulary.

If students don't know the meaning of **bold,** teachers could explain it by opening a 'Word' document and take the opportunity to introduce the three function keys.

B	*I*	**U**
Bold	*Italics*	**Underline**

For some students, there may be more unfamiliar vocabulary in the texts than is dealt with in the Vocabulary Preparation boxes. However, it is important to note that in most cases the students will not need to understand every word in a text in order to do the tasks.

In these Vocabulary Preparation sections, the students' attention will be drawn to the word classes (parts of speech) of the vocabulary items. The terms *noun, verb, adjective, adverb* and *preposition* will be used. If students are unfamiliar with these terms or what they refer to, it may be necessary to do some brief revision. The terms *countable noun* and *uncountable noun* will also be used.

1. Investigate is a verb. When we investigate a thing or an event, we look at it in detail to try find out why it happens, or how it behaves, or what it is like.

2. This is a countable noun. The properties of something are the ways it behaves (e.g. changes or moves) in particular conditions (e.g. at certain temperatures or under certain pressure levels).

3. This is a countable noun. Galaxies are groups of stars and planets. One galaxy may have many billions (1 billion = 1000,000,000) of stars.

There are many different kinds of scientific research. Researchers may test the chemical **properties** of something by doing experiments in a laboratory, or they may trial a new vaccine by giving the vaccine to one group and something else to another group, or they may **investigate** distant **galaxies** using a radio telescope, or they may carefully observe the behavior of certain animals over a long period, or they may watch the behavior of people in a shopping mall. There is probably nothing that cannot be the subject of scientific research. In this course, we will mainly be researching aspects of human behavior.

Task 1: ***Discussing your experience of scientific research***

In groups, discuss the following questions:

1. What kinds of scientific research have you done in your science lessons?
2. What kinds of scientific research have you read about or heard about?
3. What makes these kinds of research scientific?

The main purpose of this task is to get the students accustomed to forming groups, discussing in groups and giving feedback to the whole class. The secondary purpose is to get the students thinking about what scientific research might mean. However, in-depth answers to these questions should not be expected at this stage and not too much time should be spent on this task.

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Although there are many different kinds of scientific research, they normally all have the following characteristics.

- The purpose of the research is to add to our knowledge in some area of science.
- The researchers take results of previous (earlier) research as their starting point.
- They collect *data* in a *systematic* way. (Don't worry if you are not sure of the meanings of "data" and "systematic". We will come back to them.)

- They *analyse* and *interpret* the data in ways that are logical. (Again, we will come back to the words *analyse* and *interpret* later).
- They report the results of their research (i.e. what they have found out) to other scientists and sometimes members of the public by publishing in scientific journals and giving talks at scientific conferences.

Key words in scientific research

There are five words that express key concepts (ideas) central to scientific research – *hypothesis, data, analysis, interpretation* and *report.*

Key word 1: *Hypothesis*

A *hypothesis* as used in scientific research is a statement that usually has the following characteristics.

- It may be true or may not be true.
- The researchers would like to know if it is true or not.
- It is possible to collect information that can help the researchers to decide whether it is (probably) true or (probably) not true.

NOTE: The word *hypothesis* comes from Greek. Many words in scientific English are formed from words in the Greek and Latin languages, for example, *oxygen, calcium, photosynthesis* and *carbohydrate.* It is worth noting such words when you come across them, as their spellings are often a little odd, and they sometimes have irregular plural forms. The plural of *hypothesis* is ***hypotheses***.

Check the pronunciations of *hypothesis* and *hypotheses*. Practise saying the two forms of the word.

See https://www.youtube.com/watch?v=FkLY8C2L5QE&t=121s and https://www.youtube.com/watch?v=VcRcUmPdN-Q

You might also like to introduce the pronunciation of the verb *to hypothesize* "to form of make a hypothesis".

VOCABULARY PREPARATION

Read through Task 2 below. Find the words that are in bold type and use these words to complete the following sentences.

1. Quality is an uncountable noun, although it may be countable in other meanings. The quality of something is how good or bad it is. The quality of something may also be described as high or low.
2. Distilled is an adjective from the verb distil (distill in US English). When we distil a liquid, we heat it until it evaporates and then cool it down again.
3. Alert is an adjective. Someone who is **alert** is paying attention and is ready to react to whatever happens. The noun related to alert is alertness

Task 2: Evaluating hypotheses

Which of the following statements would make good scientific hypotheses? If you think any of them could NOT make good hypotheses, be ready to explain why. Can you suggest ways to make them better scientific hypotheses?

In order to answer the above questions think about:

- How useful or interesting would it be to know whether the statement is true or not?
- What kind of information would you need to discover if the statement is true or not?
- How difficult would it be to collect such information?

There are obviously no single right answers to this task. The comments below may be useful in giving feedback to students' suggestions. With weaker students it might be best to select just a few of the hypotheses to work on, especially those more obviously good or not good.

Possible hypotheses

a. If you add milk to tea, it spoils the taste. Not a good hypothesis. Whether taste has been spoiled or not is entirely a subjective judgement. No way of objectively testing it.

b. Plants grow better if music is played to them. Good. would be possible to test this (control group and experimental group). Useful for gardeners etc. to have data on this.
c. Girls are better than boys at learning languages. Interesting hypothesis but perhaps difficult to test. Maybe look at test results of male and female students in same classes? But many variables.
d. Drinking tea or coffee after 12 noon affects the **quality** of sleep at night. Quite good hypothesis. Would be interesting/useful to have data on this. But not that easy. How would you measure quality of sleep?
e. Spending more than 5 hours a day looking at a mobile phone is bad for you. Not good or at least needs refining What would count as 'bad for you' and how would you measure it?
f. K-pop is more popular than local pop music among young people in Hong Kong. Good hypothesis in that it would be possible to test if you can find a representative sample. Is it something worth knowing? Could it be related to a more general hypothesis about cultural influences in Hong Kong?
g. Students who stop revising the day before an examination generally do better in the examination than students who revise up until the last moment. An interesting hypothesis that would be worth testing but would be difficult to set up an experiment to test it.
h. K-pop is better than local pop music. Too subjective and vague to be testable. What does "better" mean in this context?
i. Getting at least 8 hours of sleep a night makes people more **alert.** Seems a hypothesis worth testing. Should be possible to design an experiment to test alertness.
j. Whether you use **distilled** water or natural spring water to water a plant, it makes no difference to how the plant grows. Good hypothesis. Should be fairly straightforward to test this.
k. You can learn a foreign language faster by studying it for 15 minutes every day than by studying it for 2 hours on one day every week. Interesting hypothesis. Testable if you can find suitable participants for the experiment
l. It is important that all secondary school students should learn a second language. Not good. What makes something important? Who decides? How to measure importance?

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Research Questions

Instead of hypotheses in the forms of statements, scientists also often express what they are going to research in the form of research questions. For example, you can express the hypothesis "Getting at least 8 hours of sleep a night makes people more alert" as a question "Does getting 8 hours of sleep make people more alert?". Research questions are often used when you want to allow for a wider range of possible results, for example "How does duration (= length of time) of sleep affect mental alertness?"

VOCABULARY PREPARATION

Read through Task 3 below and find the words that are in bold type. Use these words to complete the following sentences.

1. Motivation is an uncountable noun, although it may be countable in other meanings. It refers to how keen a person is to do something, i.e. how much they want to do it. A person's motivation to do something may be high or low.

2. Caffeine is an uncountable noun. It is a chemical substance found in coffee, tea and cocoa. It can make us more awake and active.

3. Pollution is an uncountable noun. It comes from the verb pollute. To pollute air or water means to make them dirty or impure.

4. Relationship is a countable noun. If there is a relationship between two or more things they are connected or linked in some way.

5. Success is here an uncountable noun, but it can also be used as uncountable noun. It means the opposite of failure. The verb related to success is succeed.

Now do Task 3

Task 3: Forming hypotheses and research questions

Try to come up with at least one hypothesis for each of the following general research areas.

Obviously, there are many possible answers here. Some suggestions are given below. Note that we are not concerned here with whether the hypotheses are true or not.

a. The vitamin C content of different kinds of food. Oranges contain more vitamin C than mangoes or papayas.
b. The **relationship** between **motivation** and **success** in language learning. The more students are motivated to learn a language, the more successful they will be in learning it.
c. The effects of noise on people. People living in noisy home environments suffer more stress, anxiety and depression than people living in quiet home environments.
d. Air **pollution** in Hong Kong Air quality is worse in urban areas of Kowloon than in urban areas of Hong Kong Island.
e. The effects of different kinds of music on people. If quiet slow music is played to people, their stress levels will go down.
f. The effect of **caffeine** on our body. The effects of caffeine on our body increase with age.

Write out your six hypotheses and share them with one or two classmates (if possible using Google Docs or a similar text sharing application).

Give your classmates feedback on each of their hypotheses. Use the following questions to guide your feedback.

- Is the hypothesis logical and interesting?
- Is it possible to find information to test the hypothesis?
- If it uses an "if" structure, is the structure used correctly? If necessary, check it by comparing it with hypothesis a in Task 2 above.
- Does it have a VERB+*ing* phrase as its subject? If so, is the structure used correctly? Compare it with d, e and i in Task 2 above.
- Does it contain a comparative structure (eg: *x is bigger than y*)? Is the structure used correctly Compare it with b, c, f, g, I and k in Task 2.
- What tense is used? Is it the correct tense? Compare with any of the hypotheses in Task 2.
- Does every finite verb have a subject and does the verb agree with the subject?
- A range of different structures can be used in expressing hypotheses. It is worth taking some time to ensure that the students are able to use at least basic conditional and comparative structures.
- The terms *subject* and *finite* will be used often in this course, as they refer to notions basic to producing grammatical clauses and sentences and to editing other students' work. If necessary, these terms can be revised by having students try to identify subjects and finites in a range of simple sentences. For example:
    - Music (S) affects (F) people's moods.
    - Different **kinds** of music (S) affect (F) people's moods. (The head of the noun group functioning as subject is in bold)
    - Does (F) music (S) affect people's moods?
    - A person's **mood** (S) is (F) affected by music.
    - People's **moods** (S) are (F) affected by music.
    - Are (F) people's **moods** (S) affected by music?
    - Is (F) a person's **mood** (S) affected by music?

When you have received your classmates' feedback, revise your hypotheses as necessary. If you have any doubt, check with your teacher.

Now try re-writing at least two of your hypotheses as research questions.

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Key Word 2: *Data*

Data is information that scientists collect in order to help them discover if their hypotheses are true or not, or to discover what the answers to their research questions are. Data should be *systematic*. This means that it must be collected in a careful and efficient way, according to a method that you have planned in advance (a "system"). Things that you have read about, or something a classmate has told you, or something you noticed while walking around – none of these by themselves are data. However, if you walk along exactly the same route every day at exactly the same time and count the number of people, or dogs or cars that you see, this could be data. Or if you ask every student in your form the same question in the same way, and if you can be reasonably sure that they are telling you the truth, then their answers could be data. Of course, it must be a question that gives you answers that will help you test your hypotheses or answer your research questions. The methods you use to collect data are therefore very important, and need to be planned carefully in advance.

NOTE: The word *data* comes from Latin (it means "given"). In Latin, it is a plural noun and so some writers prefer to use it also as a plural noun in English, for example "The data <u>are</u> clear". However, as we hardly ever use the Latin singular form *datum*, many writers use *data* as an uncountable noun, for example "The data <u>is</u> clear". It does not matter whether you use it as a plural noun or an uncountable noun, as long as you are consistent (= always do the same).

Task 4: Collecting data

Take at least two of the hypotheses that you came up with while doing Task 3 above and suggest how you might systematically collect data to test them.

This is just to get students thinking about what good data might be. They should not be expected at this stage to specify detailed data gathering methods.

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Key Word 3: *Analysis*

Once scientists have collected their data, they need to *analyse* it. When they analyse data, they look very carefully at it in order to find patterns that will help them to understand it or explain it. For example, an analysis (= the noun from analyse) of data may enable scientists to discover ways in which some things are similar and some things are different, so that they can *classify* them, i.e. put them into groups according to their similarities and differences. Analysis may also show how some things change over time. Sometimes the analysis may reveal a *correlation*, i.e. it shows that things are related in some way, because whenever one thing occurs another thing is likely to occur, or whenever one thing changes, another thing is likely to change. Often data will be in the form of numbers, so scientists need to do some kind of arithmetical or mathematical analysis.

NOTE: *Analyse* is a verb. It can also be spelled *analyze*, especially in the US. The noun is *analysis*. Like *hypothesis*, *analysis* comes from a Greek word, and its plural is *analyses*.

Check the pronunciations of *analyse*, *analysis* and *analyses* and practise saying them.

See https://www.youtube.com/watch?v=aszUJcF5QQc

Key Word 4: *Interpretation*

After scientists have analysed their data, they need to *interpret* the results of their analyses. In other words, they must try to explain the patterns in the data using logical, scientific arguments. They will also normally try to relate the results to the hypotheses or research questions that they started with. It is important not to use personal opinions or guesses. Note that is rare for the *interpretation* (= the noun from *interpret)* to claim that the data proves that a hypothesis is true or not true. In most cases, an interpretation can only give some good reasons for concluding that the results show that a hypothesis is probably true or probably not true.

Key Word 5: *Report*

If scientists do research and find something interesting, they will want to share their findings with other scientists. This is not only to inform other scientists of what they have found but also to give other scientists a chance to check their results, sometimes by repeating the same experiments to see if they get the same results. Therefore when scientists report on their research, they have to be clear about how they collected and analysed the data, and they have to show that their interpretations are logical and based on the data. Note that the word *report* is both a countable noun and a verb, so we can say both "we will report [*verb*] our results" and "we will write a report [*noun*] about our results".

Be sure that you are clear about what is meant by *hypothesis/hypotheses; data, analysis/analyses*, *interpretation* and *report* in the context of scientific research, as we shall be referring to these words and concepts frequently throughout this course.

Lessons 2 & 3: Getting Started

Teachers' Notes

By the end of these two lessons, the students should be clear about what they are required to do for their research projects. They should also be ready to start collecting data. There should easily be enough work here to fill two lesson periods.

Three topics for research are suggested and the students are guided through the steps they need to take to complete the research. There is a separate set of students' notes for each topic.

It is suggested that the students be divided into groups of about six. In most contexts this means that at least two groups in a class will be working separately on the same project.

A suggested procedure is given for each project but students should feel free to adapt this to their own circumstances. If you have some very well motivated and able students, you may wish to allow them to design their own projects with different research topics and aims, although they should refer to the projects provided as a template.

Project Title: The Effects of Music/Multitasking/Laughter and Mood

In this project, your group will be investigating the ways in which people are affected by music/people's ability to multitask/the relationship between laughter and mood.. You will first be asked to explore the topic by answering some questions. You will then be guided through the steps you should take to start doing the research.

The tasks in these notes are for lessons 2 and 3. You may also need to do some work by yourself in the time between the two lessons

VOCABULARY PREPARATION

Read through Task 1 below and find the words that are in bold type. Use these words to complete the following sentences.

(The effects of music)

1. The noun gender. can be countable or uncountable. In biology we talk about the *sex* of people or animals. In talking about humans, we sometimes use the word gender instead. For most people, their biological sex is the same as their gender, i.e. male or female.
2. Pulse is a countable noun. A pulse is a regular beat. A person's pulse is the regular beating of blood through their body.
3. Mental is an adjective that describes what goes on in people's minds.

(Mutltitasking)

1. A benefit is a good result you get from something. It can also be used as a verb. Something that benefits you is good for you.
2. If you are familiar with something, you know it well.
3. A risk is a possibility that something bad or unpleasant may happen.

Task 1: ***Exploring the topic***

The questions in this task (different for each project) are designed to get the students thinking about and exchanging ideas about the topics of their research. Sophisticated or in-depth answers should not be expected at this stage. However, they should be ready to later check their answers through on-line or library research. If students are doing a project of their own design, they will need to make their own list of what they need to find out about.

VOCABULARY PREPARATION

Read through Task 2 below and find the words that are in bold type. Use these words to complete the following sentences.

1. Someone who is your peer is the same as you in some way or equal to you in some way. For example, he or she may be the same age as you or may do the same work as you. A scientist's peers are other scientists, usually those working in the same area of science.
2. Nutrition is an uncountable noun that refers to the processes by which humans and all other living things take food into their bodies and absorb it.
3. Diet is a countable noun. A person's diet is the food that he or she regularly eats.
4. When a book, an article, a film etc. has been reviewed, somebody has read it or looked at it and expressed their opinion about it.
5. A person who is impartial is not involved in a particular situation and should therefore be able to give a fair opinion about it.
6. Information that is reliable is likely to be true or correct. A source that is reliable is therefore likely to contain true or correct information.

Task 2: ***Evaluating online sources***

The first step in doing your research is to find out what other scientists have said about your topic and what research has already been done. Much of the information you need will be online, but you must be careful that you take information only from **reliable** sources.

Suppose your research topic is related to **diets** and health. You have googled "heathy diet" and found the following five web addresses.

1. Ad. https://www.noom.com *Diet Meal Plans – Get Healthy Again with Noom*
2. https://www.who.int/news-room/fact-sheets/detail/healthy-diet *Healthy diet -WHO | World Health Organization*
3. https://en.wikipedia.org/wiki/Healthy_diet *Healthy Diet – Wikipedia*
4. https://pubmed.ncbi.nlm.nih.gov/32012681/ *Defining a Healthy Diet: Evidence for The Role of Contemporary Dietary Patterns in Health and Disease*
5. https://www.nutrition.org.uk/healthyliving/healthydiet/healthybalanceddiet.html *A Healthy, Balanced diet – British* ***Nutrition*** *Foundation*

Here are some comments you might make about these web addresses without even reading their content. Which comments could apply to which addresses?

A. This looks like a genuine scientific research paper (article) – worth checking. (No. 4)

B. This is a source I know. Usually, I find their articles very useful in starting to research any subject, but I should not rely entirely on this source, as it is not possible to know who actually writes the articles. (No 3)

C. I think this is a commercial company. They are probably trying to sell something. I had better not rely on their information. (No. 1)

D. This sounds like it comes from a reliable source, but actually I have never heard of this organisation. Anyone could use this name. I had better check first before using information from them. (No. 5)

E. This is an organisation that is well respected world-wide and any information it provides is likely to be scientifically reliable. (No. 2)

Later, you check two of the sources mentioned above (nos. 4 & 5) and find the following pieces of additional information. Do these additional pieces of information change your evaluation of the reliability of these two sources? Do you think they are more reliable or less reliable than you first thought?

No.4

Here are more details about the paper (article) that this website refers to.

> *Defining a Healthy Diet: Evidence for the Role of Contemporary Dietary Patterns in Health and Disease*, Hellas Cena and Philip C. Calder, in *Nutrients* 2020 Feb, 12(2): 334

And here is what you have found out about *Nutrients.*

> *Nutrients* (ISSN 2072-6643; CODEN: NUTRHU) is a **peer-reviewed**, open access journal of human nutrition published monthly online by MDPI.
>
> MPDI is an online publisher of scholarly articles based in Switzerland.

Obviously more reliable because it is from a reputable journal and other scientists have read it and agreed that it is suitable for publication

No. 5

This is what the British Nutrition Foundation say about themselves:

> The British **Nutrition** Foundation is a registered charity.
>
> - We provide **impartial**, evidence-based information, resources and training on food and nutrition. (Find out more here.)
> - BNF's vision is '*Everyone can access healthy, sustainable diets*' and it is contributing towards this through its Mission '*Translating evidence-based nutrition science in engaging and actionable ways'.*
> - We do not lobby, endorse any products, engage in food advertising campaigns or allow commercial or political pressure to influence us when publishing or disseminating information.
> - We are a founding member of The Academy of Nutrition Sciences - a joint initiative between the Association for Nutrition (AFN), the British Dietetic Association (BDA), the British Nutrition Foundation (BNF)

and the Nutrition Society (NS) - a collective voice for evidence-based nutrition science.

The BNF seems to be a reputable organization providing reliable information. Note that the students should be able to make this evaluation even if they do not know all the words in the above text.

Task 3*: Searching for information about your own topic*

Working in your group, use some key words relating to your own research project to find some online sources. Which sources look as if they may have reliable information? How do you know?

Beginning with the sources you have found, try to find information to answer the following questions.

Each project of course has a different set of questions. It is likely that students will need some help in understanding and evaluating some of the information they find. They should also understand that what they do in these two lessons is just a start. They may need to continue working on these questions both in class and out of class until they write the final drafts of their project reports.

Continue looking for information to answer these questions whenever you have time after the lesson. Use not only online sources but also any books and other materials you can find. Bring notes on everything you find to lesson 3 and share the information with your group.

NOTE: Whenever you find a piece of relevant information, take note of it and if it is online, copy the URL and the name of the website. If it refers to a scientific article that has been published, take a note of the writer or writers' names, the title of the article, the name of the journal as well as the issue number and date of publication. If you find information in a book, make sure you take a note of the book's title, the writer (or writers), the publisher and the date of publication. Also keep note of the page numbers.

Task 4: *Drafting hypotheses and research questions*

Working with your group, *draft* (see note below) AT LEAST three hypotheses or research questions for your research.

NOTE: You will often need to *draft* text during this course. *Draft* can be used as a verb or a noun. A draft is an early version of the text that you want to write. For example, you might need to write a first, second, third, fourth and perhaps even fifth draft of each section in your research report. This is normal. No scientist – or any other kind of writer – would try to publish the first draft of a text that he or she has written. Luckily, these days we don't have to constantly re-write our texts by hand. Using a word processor makes it a lot easier to draft and redraft. You will also need to sometimes share drafts with your classmates or teacher. Please right from the start, do all your drafting in Word or a similar word processing programme and share your drafts using an application such as Google Docs. Your teacher will guide you in this.

VOCABULARY PREPARATION

Read through Task 5 below and find the words that are in bold type. Use these words to complete the following sentences.

1. A volunteer is someone who does something without wanting to be paid or be rewarded for doing it, usually because they feel that it is something worth doing.
2. A participant is someone who takes part in some kind of activity, for example a competition.
3. Recruit is transitive verb. When you _____ someone, you persuade them to join a group, a society or an organization.

Task 5: *Preparing to collect data*

You need to start collecting data as soon as possible, so make sure you agree at least by the end of lesson three on the methods you will use.

Below is a suggested procedure (set of steps) for collecting data for your project. You do not have to exactly follow this procedure. You may change it or adapt it to fit your hypotheses/research questions, the time you have to collect data, etc. Discuss the procedure in your group and make any changes you think are necessary.

Suggested Procedure:

The students should be encouraged to think about how all of them can participate in gathering data and whether the procedures need to be changed in any way to suit their particular circumstances.

In the trials, students seemed to need most help in drawing up questions for interviews. The interviews should of course be conducted in Cantonese or whatever language is most convenient for the interviewees, although a version in English should be kept and attached to their final report.

If time permits, it will be very useful to role play the interviews and experiments/games with some students playing the researchers and others the participants.

Lesson 4: Reporting Research

Introduction

When you have completed your research project, you will need to will write a research report. The report will explain what you were researching, how you did the research, what the results were and what you think the results mean. The purpose of such a report is not only to share your findings, but also to convince readers that your research is valid, in other words to convince them that the research was carried out properly and that your results can be trusted.

In this lesson, we will look at how research reports are usually organized to do these jobs. In other words, we will look at what sections reports usually contain, what the content of each section usually is and in what sequence (order) the sections occur. We will also start to explore the kinds of vocabulary and grammar that can be used in each section.

You should also have enough time after completing the tasks in this lesson to continue discussing your research project with your group mates. By now, you should have drafted your hypotheses/research questions, begun to collect data, found some definitions and other information about your topic as well as information about previous research.

By the end of this lesson the students should have a clear idea about how research reports can be organised and what the content of the different sections normally is. Of course, what is presented in this lesson is to some extent a simplification, as there is a lot more variation in this genre than can be covered in this course.

This lesson also introduces some basic grammar and vocabulary that the students will need to use when they write their own reports. From the trials we know that for some students this will be very elementary, while for others it will be a little challenging. With the latter group, it is worth spending some time on these sections and perhaps doing some supplementary practice.

The texts in this lesson have been adapted only slightly from the original versions, so some students may find them difficult, but it is important to note that they do not need to understand every detail in the texts. They only need to understand enough to be able to complete the tasks.

Task 1: Sequencing the sections of a scientific report

Although is no one way to write a report of scientific research, most such reports are likely to contain 5 sections that we can label as follows.

- Methods
- Conclusion
- Discussion
- Introduction
- Results

In the above list, the 5 sections are not in a logical order. In what order do you think these 5 sections are actually likely to occur in a research report?

The logical order is: Introduction ^ Methods ^ Results ^

Discussion ^ Conclusion

This should be easy for students provided that they understand the meanings of the 5 labels. If they don't, it may be useful draw their attention to the relationship of Introduction, Discussion and Conclusion to the verbs *introduce, discuss* and *conclude.*

You could point out that "Methodology" is sometimes used instead of "Methods", and "Findings" is sometimes used instead of "Results

VOCABULARY PREPARATION

Read through Task 2 below. Find the words that are in bold type and use these words to complete the following sentences.

1. When you *summarise* something, you give a *summary* of it. A *summary* is a short, written or spoken version of something. The verb *summarise* can also be spelled with a "z", especially in US English.
2. *Limitations* is a countable noun. When we talk about the *limitations* of something, we explain in which ways or contexts it can be used and in which ways or contexts it cannot be used. It is related to the verb *limit*.
3. *Phenomenon* is a countable noun. It is a general word for anything that exists or happens. It is formed from a Greek word and the plural form ends in "a".
4. *Previous* is an adjective. A *previous* event or situation is an event that happened before another event or situation.
5. *Applications* is a countable noun. It refers to how a piece of knowledge or a rule is used in a particular context or for a particular purpose. It is related to the verb *apply*.
6. *Initial* is an adjective meaning "first", "at the beginning", "where something started".

Task 2: Exploring the content of each section

The paragraphs in the table below describe what content you are likely to find in each section of a research report. Can you match these descriptions with the labels for the 5 sections that you sequenced in Task 1?

Content	Label
This section tells the readers what the researchers found from their analyses of the data that they collected. Often, these findings are set out in tables or in various kinds of diagrams.	Results
This section identifies and describes the **phenomenon** that was researched. It also usually refers to **previous** research that has been done on the same or a similar topic and makes it clear why more research was needed. It also states the research questions or the hypotheses that the research was designed to test.	Introduction
This section tells the reader how the research was carried out. In other words, it explains what kinds of data the researcher(s) collected, where they collected it and how they analysed it.	Methods
This section usually briefly **summarises** the most important findings from the research. It also often suggests how the findings could be made use of, i.e. their possible **applications.** It may also give suggestions for further (more) research.	Conclusion
This section says what the researchers think the results mean and draws attention to anything that seems important, interesting or surprising. It usually relates the findings to the **initial** hypotheses or research questions. It will also usually attempt to explain the results and to compare the results of the research with results from previous research. It may sometimes also say something about the **limitations** of the research.	Discussion

Note that the above description of the contents of each section given above is only a guide. In particular, some of the elements listed in the discussion section may also occur in the conclusion section. In fact, in some reports, discussion and conclusion may be merged into one section.

VOCABULARY PREPARATION

Read through task 3 below and find the words and phrases that are explained in the following sentences. Then do the task.

1. When we are looking at something, we are using our visual skills.
2. When we are listening to something, we are using our auditory skills.
3. When we are saying something, we are using our verbal skills.
4. If a relationship between two things is **statistically significant** (adverb + adjective), it means that statistical analysis shows that the relationship is due to more than just chance (and therefore can be explained).

Students have probably not yet studied statistical significance and it is not necessary to spend time explaining it in more detail here. They will not be expected to do tests for statistical significance in reporting results from their research in this course.

Task 3: Identifying the content of different sections

Below are the first paragraph and the last paragraph from a report of research into multitasking, carried out by students in Hong Kong. The first paragraph is the beginning of the introduction section. It identifies the phenomenon (multitasking) that was researched, defines it and makes a generalization about it. The last paragraph is the whole of the conclusion. It summarises the findings (results) and suggests further research.

Multitasking: A Study of Gender Differences

First Paragraph

The term multitasking refers to doing more than one task at the same time, for example talking on the phone while typing an assignment. Multitasking is common in everyday life, including when we are working, when we are studying, when we are communicating or even when we are just walking around.

.....

Last Paragraph

The findings of this study clearly suggest that there is no **statistically significant** relationship between the multitasking ability of men and women. However, further research could investigate a range of specific tasks that might show a gender difference in certain kinds of multitasking abilities.

Between these two paragraphs, there are 10 other paragraphs, which are given below (out of order). Read through each paragraph and decide which section of the report it belongs to. Note that the introduction section has two additional paragraphs, the methods section has two paragraphs, the results section has three paragraphs and the discussion section also has three paragraphs. After you have decided which paragraphs belong to which sections, put the paragraphs within each section into the most logical order.

Section	Paragraph nos.
Introduction	2 4
Methods	6 1
Results	5 9 8
Discussion	10 7 3
Conclusion	xxxxxxxxxxx

Deciding which paragraphs go into which sections should be straightforward, although some variation may be possible in the order of paragraphs within sections. In the results, it would be possible to place paragraph 5 last instead of first; however, the writers chose to put the paragraph with a general statement about results before the paragraphs giving greater details. Similarly in the discussion, the more general finding relating to the initial hypothesis precedes a paragraph with more specific result not relating directly to the initial hypothesis.

Multitasking: A Study of Gender Differences

1. Second, an experiment involving a task that required use of **visual**, **auditory**, and **verbal** skills (Experiment B) was conducted. The participants were asked to complete an online word search on the topic "fruits", while at the same time listening to and answering simple maths questions.

2. Various research studies have identified many factors that can affect a person's ability to multitask. Such factors range from pressure coming from a person's environment, such as a coming deadline (Sarmento & Tsai, 2015), to more personal factors such as habits (Sanbonmatsu, Strayer, Medeiros-Ward, & Watson, 2013).

3. One limitation of our study is that we did not have a lot of information on the personal backgrounds of many of the participants. For example, factors such as whether the participants are frequent game players, or whether their field of study or work assists in their multitasking ability could have influenced their performance.

4. The purpose of our study was to investigate the relationship between gender and the ability to multitask in a sample of Hong Kong participants. Our hypothesis was that there is no statistically significant difference in the multitasking ability between the genders.

5. On average, the males scored slightly higher on average than the females in Experiment A, while the females scored slightly higher on average in Experiment B. However, the differences were not found to be statistically significant

6. First, a visual-visual experiment (Experiment A) was conducted to test the visual-visual multitasking ability of the participants (see Appendix 1). As each level of difficulty increased, additional mini-games were added to the screen to be played at the same time, with two or more games being controlled by each hand. Each participant was asked to play the games three times. All of the final scores in the games were recorded.

7. The increase in the participants' performance in Experiment A as more tries were completed seems to indicate that with more practice, the multitasking ability of an individual can improve, regardless of gender. Other research similarly suggests that multitasking ability can be improved though training (Dux, Tombu, Harrison, Rogers, Tong, & Marois, 2009).

8. In Experiment B (visual-auditory-verbal tasks), the average scores for males and females were 22.35 and 23.47 respectively. The scores of males ranged from 16 to 28, while the scores of females ranged from 16 to 29, as shown in Figure Two.

9. In Experiment A (visual-visual tasks), the average scores for males and females were 53.3 and 51.4 respectively. The scores of males ranged from 22.7 to 90.3, while the scores for females ranged from 22 to 91.3, as shown in Figure One. Figure One also shows that scores for both males and females increased as more tries were completed.

10. The findings support our initial hypothesis that there is no statistically significant relationship between the multitasking ability of men and women. It challenges the findings of previous research which suggested that women are better at multitasking than men (Stoet, O'Connor, Conner, & Laws, 2013; Kuptsova, Ivanova, Petrushevskiy, Fedina, & Zhavoronkova, 2016) and confirms research that found no statistically significant difference between the performance of the two genders (Buser & Peter, 2012).

Now read through the whole report again with the paragraphs in the correct order. Some important information is missing. Can you see what it is? Hint: the missing information should be in the methods section.

Missing information: There is nothing about how many participants there were and how they were selected. This is important information that readers need if they are to decide whether the results are valid or not.

Task 4: Using words and phrases often used in research reports

In the second column of the table below you will see a list of verbs that often occur in research reports. Note that the verbs are in different tenses and voices (active or passive). Write complete sentences with these verbs by matching them with appropriate subjects, objects (including *that*-clauses) and adjuncts* listed in the other columns. Note that every verb must have a subject, but not every verb needs an object or adjunct. Be careful that you don't match plural subjects with singular verbs, or singular subjects with plural verbs.

*Adjuncts are words and phrases in a sentence which are additional to the subject, the verb and any objects. Adjuncts often add information about the when, where and how of the situation expressed by the sentence. For example:

We collected the data very carefully.
We collected the data from three kinds of experiment.
We collected the data on three different days.

SUBJECTS	VERBS	OBJECTS	ADJUNCTS
We ... (can be used more than once)	*has shown*	*a total of 20 participants*	*in Table 2 below*
The average scores of the participants	*can be defined*	*our initial hypothesis that slow, gentle music can have a calming effect on a person's mood*	*as the intense fear of spiders*
Arachnophobia	*interviewed*	*that recycling stations should be set up in every public housing estate*	*very carefully*
Our findings	*were recorded*	*the scores for the participants according to age group*	*using a smart phone voice recorder application*
All the interviews	*were conducted*	*that chocolate can trigger migraine attacks*	
Figure 5	*analysed*	*the multitasking abilities of people across a wider range of ages*	
Previous research	*shows*	*that music can affect a person's mood*	
Three experiments	*are set out*	*the results*	
Further research	*suggests*		
This result	*support*		
	recommend		
	could investigate		

Now read through all your sentences. Which are most likely to occur in introduction sections of research reports, which in methods section, which in results section, which in discussion section and which in conclusion section?

1. *We interviewed a total of 20 participants.* (Methods)
2. *The average scores of the participants are set out in Table 2 below.* (Results)
3. *Arachnophobia can be defined as the intense fear of spiders.* (Introduction)
4. *Our findings support our initial hypothesis that slow, gentle music can have a calming effect on a person's mood.* (Discussion OR Conclusion)
5. *All the interviews were recorded using a smart phone voice recorder application.*(Methods)
6. *Figure 5 shows the scores for the participants according to age group.* (Results)
7. *Previous research has shown that music can affect a person's mood.* (Introduction)
8. *Three experiments were conducted.* (Methods)
9. *Further research could investigate the multitasking abilities of people across a wider range of ages.*(Discussion OR Conclusion)
10. *We analysed the results very carefully.*(Methods)
11. *We recommend that recycling stations should be set up in every public housing estate.* (Discussion OR Conclusion)
12. *This result suggests that chocolate can trigger migraine attacks.* (Results OR Discussion

Lesson 5: Exploring Introductions

Introduction

As we saw in the last lesson, the introduction section of a research report is the part in which you explain to other scientists what it was that you researched and what you hoped to find out. In this lesson, we will look at how the introduction sections of two research reports are organized, and what grammar they use.

If you have time after finishing all the tasks in this lesson, start to plan what you will write in the introduction of your own report.

VOCABULARY PREPARATION

Read through Task 1 below. Find the words that are in bold type and use these words to complete the following sentences.

1. Excessive is an adjective that describes something that is too large, too extreme or that there is too much of.
2. Specific is an adjective. It refers to a description of something that is more precise and more limited than a general description.
3. Estimate is a verb. When we estimate something, we calculate it roughly, based on whatever evidence we have.
4. Our perception of something refers to our awareness of it, through any of our senses. It can also mean how we think about something or what our opinion of it is.
5. The noun disposal is related to the verb dispose**,** which means to get rid of something that we no longer want or need. Note that both the verb and the noun are normally followed by *of*.

Task 1: Exploring the content of an introduction

Text 1 (below) is the introduction section of a research report written by some university students. Read the text through and find where in the text the following elements occur.

- A statement of the general phenomenon that that the research was concerned with (GP)
- The **specific** issues that the students investigated (SI)
- Previous research on the phenomenon (PR)
- Specific details about the phenomenon (DP)

Text 1

A Study of Rubbish Disposal at a Hong Kong University

Introduction

In Hong Kong, **disposal** of rubbish is a major issue. (GP)

According to statistics from the Hong Kong Environmental Protection Department (2019), the average daily quantity of solid rubbish in 2017 amounted to more than 15,000 tonnes. **Excessive** production of rubbish is leading to the filling up of all Hong Kong's landfill sites. Robson (2017) **estimates** that Hong Kong's landfill sites will become full by 2020 and will no longer be able to accept additional rubbish. (DP)

Previous research has focused mainly on collecting data on how much rubbish is produced by different sectors in Hong Kong. (PR)

Our research focuses on the rubbish disposal problem at one institution, the City University of Hong Kong, and explores the **perceptions** that students at the university have of the problem.(SI)

We address the following questions.

1. How is rubbish disposal managed at the university?
2. What problems are there with managing rubbish disposal at the university?
3. What are the students' perceptions of the problems?
4. What suggestions do the students have on how to solve the problems? (RQ)

The labels for the elements are not important. They are suggested just to help students be aware of the logical pattern of this section of the report.

Questions to think about.

1) Is the order of elements in this text logical?

Yes, the general principle is from broad to narrow. However, some students might find it strange to see the research questions (RQ) being placed at the end of the introduction rather than at the beginning. This is usual in such reports, and accords with the 'broad to narrow' logic.

2) Do you think that any element in this introduction should be expanded (made longer)?

Further information should be added to the previous research element (PR). Writers of such reports need to show that they knew about and had taken into account relevant research done previously before beginning their own research.

Task 2: Exploring the grammar of an introduction

Tense

Five different tenses are used in the first two paragraphs of Text 1. They are simple present, present continuous, simple past, present perfect and simple future. Please read through the examples below, identify the tenses used in them and match each one with the best description of why the tense is used.

Tenses	**Use**
1. In Hong Kong, disposal of rubbish is a major issue. Simple Present Tense 2. ... the average daily quantity of solid rubbish in 2017 amounted to more than 15,000 tonnes. Simple Past Tense 3. Excessive production of rubbish is leading to the filling up of all Hong Kong's landfill sites. Present Continuous Tense 4. ... and will no longer be able to accept additional rubbish. Simple Future Tense 5. Previous research has focused mainly on collecting data on how much rubbish is produced by different sectors in Hong Kong. Present Perfect Tense	..... tense is used here because the sentence tells us what is happening now (and has not yet finished). (3) ..... tense is used here because the sentence tells what the situation was at a specific time in the past. (2) ..... tense is used here because this sentence predicts a future situation. (4) ..... tense is used here because the sentence tells us what the situation is now. (1) ..... tense is used here because it is looking back at what some people did some time before now, but it does not tell us exactly when they did it. (5)

The names of the tenses used here are those most commonly used in Hong Kong classrooms. The teacher should of course use whatever names the students are familiar with.

Some of the uses of simple present tense in the above introduction are more difficult to explain. For example:

- Robson (2017) estimates that Hong Kong's landfill sites will become full by 2020 ...
- Our research focuses on the rubbish disposal problem at one institution, the City University of Hong Kong, and explores the perceptions that students at the university have of the problem.

The first of the above examples tells us what Robson wrote (or published) in 2017, i.e. in the past. Therefore the past tense verb "estimated" could have been used instead of

"estimates", and "would" could have been used instead of "will". Why do you think the writers used present tense here? Which do you think is better in this context, present tense or past tense?

Using present tense to report what someone wrote in a published work is common and often implies that what the person wrote is still relevant, applicable or even true. Using past tense would not be incorrect here, but it could imply that the writers have some doubt about Robson's estimate and are perhaps intending to disprove it.

The second of the above examples is talking about research which the writers have already done. So the past tense verbs "focused" and "explored" could have been used. Why do you think the writers used present tense here? Which do you think is better in this context, present tense or past tense?

Perhaps because the research is being described now in this report, it can be seen as being "here and now". Or perhaps because the writers are thinking of the writing of the research report as still part of their research work. Either present or past would be possible here.

Nominalisation

In the two following two sentences from paragraph 1, the nouns *disposal, production* and *filling up* all represent kinds of doing or happening – people dispose of rubbish, they produce too much rubbish and the landfill sites are filling up.

1. In Hong Kong, disposal of rubbish is a major issue.

2. Excessive production of rubbish is leading to the filling up of all Hong Kong's landfill sites.

The use of these nouns may seem a bit strange at first, because usually we use nouns to talk about people and things (like chairs, trees, mountains, children etc.), but we use verbs to talk about what people do (dispose of, produce, laugh, investigate etc.) and about what happens (fill up, fall, break, evaporate etc.).

Disposal, *production* and *filling up* are formed from the verbs *dispose, produce* and *fill up.* We can also form nouns from adjectives, as in the following example in which *happiness* is a noun formed from the adjective *happy.*

3. Happiness is very hard to define and measure.

Forming nouns from verbs and adjectives in this way is called *nominalisation* (uncountable). The resulting nouns can themselves also be called *nominalisations* (countable). Nominalisation is common in scientific writing.. The word *nominalization* is of course itself a nominalisation of the verb *nominalise,* which means to turn into a noun. Note that in US English, it may be spelled nominalization

As can be seen in examples 1 to 3 above, nominalisations can be used as subjects and as objects, just like any other noun. This can be very useful when we need to represent kinds of doings or happenings or qualities as subjects or objects of clauses. Verbs and adjectives cannot, of course, normally be used as subjects or objects.

In everyday speech we tend to use fewer nominalisations. For example, the content of the above three written sentences might be expressed in speech as something like the following examples, in which verbs and adjectives are used instead of nominalisations.

1a. In Hong Kong we dispose of so much rubbish every day. It's a major issue.

2a. Because we produce far too much rubbish, all Hong Kong's landfill sites are filling up.

3a. It is very hard to define what we mean when we say someone is happy and it is very hard to measure how happy they are.

Note that the spoken versions tend to be longer and more complex. No. 1 is one sentence while 1a is two sentences. No. 2 is a simple sentence consisting of one clause, while 2a is a complex sentence with two clauses. No. 3 is also a simple sentence with one clause, whereas 3a is a complex sentence with six clauses.

When speaking, it usually doesn't matter much if we use lots of clauses to say what we want to say. In fact, if we pack what we want to say into a smaller "grammatical space" by using a lot of nominalisations, it can make our speech seem rather dense and sometimes hard to understand. People may feel that we are "talking like a book".

However, in writing, particularly scientific writing, nominalisations are commonly used to make the writing more concise. Nominalisations are particularly useful in science for summing up and labelling complex processes, such as *distillation* (from the verb *distill*) and *evaporation* (from the verb *evaporate*). We can then use these nominalisations as subjects of clauses and sentences to say more about these processes.

Using nominalisations also helps us to classify processes more easily. For example, rain, rivers or the sea can *erode* rock and soil by wearing them away until they are destroyed. Example no. 4 below uses the nominalisation *erosion* to introduce some of the different ways in which rock and soil are eroded and the results these processes have. Think how much more difficult it would be to talk about this using only the verb *erode* instead of the noun *erosion.*

4. There are a number of types of erosion that can be observed in our region. These include water erosion, wind erosion, tunnel erosion and stream bank erosion.

Although nominalisations are useful, you need to be careful when you use them.

Firstly, there are many different suffixes used to form nouns from verbs and adjectives, such as *-ion* (e.g. *discussion*), *-ment* (e.g. *agreement*), *-ity* (e.g. *possibility*) and *-ness* (e.g. *sadness*) and you need to check which suffix is used with which verb or adjective. However, as we have seen, sometimes the form does not need to change at all (e.g. the words *increase, rise* and *change* can be both verbs and nouns). Nouns can also be formed by adding *-ing* to any verb (e.g. *filling up*, see no. 2 above). However, sometimes there is no noun that can be formed from a particular adjective, so we have to use a noun related only by meaning, for example:

> 4a. The train was travelling fast. This may have caused the accident.
> 4b. The high speed of the train may have caused the accident. (It would be very unusual to say *fastness*)

Secondly, it is not enough just to be able to form nouns from verbs and adjectives. A nominalisation may be the head of a noun group* which needs to contain lots of other information. In English, unlike in Chinese, information is often put into a noun group after the noun as well as in front of the noun, so in order to write good scientific English you will need to make sure you can use the structures that let you do this. For example:

> 1. Careful investigation of all the data shows that...
> In this example, *investigation* (from the verb *investigate*) is the head of the noun group. It is followed by a prepositional phrase beginning with *of*. Such *of*-phrases are very commonly used in noun groups and often correspond to what would be the object in a clause without the nominalisation, e.g. *We carefully investigated all the data.*)
>
> 2. The sharp increase in the scores was unexpected.
> In this example, the head (*increase*) is followed by a prepositional phrase beginning with *in.* Here *the scores* would be the subject in a clause without nominalization, e.g. *The scores increased sharply.*)
>
> 3. Recent awareness that the problem is getting worse has led to ...,
> In this example, the head *awareness* (from the adjective *aware*) is followed by a *that*-clause that contains a finite verb (*is getting*).
>
> 4. The sharp increase in the scores that we observed was unexpected.
> In this example, there is both a prepositional phrase and a *that*-clause after the head.

Note that in all these examples, the verbs are singular (*shows, has led, was*) because the heads of the noun groups are either uncountable (*investigation, awareness)* or singular (*increase*).

> * A *noun group* consists of a main noun (the *head*) and everything that goes with it. For example, in the noun group *the large increase in temperature that we observed (was unexpected)* the head noun *increase* has an article and an adjective in front of it , and a

prepositional phrase and a *that*-clause after it. Note that some grammar books use the term *noun phrase* instead of noun group

Try changing the following sentences into a more informal, spoken style by removing the underlined nominalisations. Note that sometimes you will need to add a subject that is not present in the original sentence. The first one has already been done.
Student writers need to be able not only to use nominalisations where necessary, but also to "unpack" nominalisations that they come across in their reading, in order to be sure that they fully understand their meanings.
There are of course several ways of re-writing most of the sentences in this exercise as well as in the exercise that follows it (creating nominalisations). The hints are intended to guide the students but if they are able to write acceptable alternative versions ignoring the hints, that will also be good.

1. There has recently been much public discussion of this issue.
   Answer: The public has discussed this issue a lot recently.

2. The building of so many factories in the area has greatly affected air quality.
   (Hint: Begin with *Because...* and either add a subject or use passive voice.)
   Because the government/our city council has built so many factories (Because so many factories have been built) in this area, the air quality has been greatly affected.

3. Practice can improve our ability to multitask.
   (Hint: Use *the more ... the more* and add a subject)
   The more you/one/we practise multitasking the better you/one/we will get (at it).

4. An increase in the speed of an object will lead to an increase in its mass.
   (Hint: Begin with *If* or *When* OR use *the* adj+*er* ... *the* adj+*er*)
   The faster an object moves, the greater its mass (will be). OR When/if an object moves faster, its mass will increase.

5. Multitasking using leads to a fall in efficiency.
   (Hint: Begin with *When* and add a subject. Use the adjective *efficient*)
   When people multitask, they become less efficient.

Now try re-writing the following sentences in a more written, scientific style by nominalising the underlined verbs.

1. The population started to grow rapidly in the 1970's. This surprised the government.
   Answer The rapid growth in the population in the 1970's surprised the government. (Note the change of the adverb *rapidly* into the adjective *rapid*)

2. When we changed the nature of the task, the average scores increased.

(Hint: The noun *change* is followed by the preposition *in*. Verbs that can express cause and effect between nouns include *result in, cause* and *lead to*.)
A change in the nature of the task resulted in/ led to/caused an increase in the average scores.

3. If we laugh frequently our health improves.
(Hint: You can use the *-ing* form *laughing* or the noun *laughter*. The noun from *improve* is *improvement*.)
Laughing frequently leads to/brings improvements in health. OR Frequent laughter leads to/brings improvements in health.

4. We measured the air quality in the four urban areas. It was almost the same.
(Hint: Use the nominalisation *measurement*)
Measurements of air quality in the four urban areas showed similar results.

5. The people living in Area B are relatively poor. This may be why their levels of education are lower.
(Hint: Use the nominalisation *poverty*)
The relative poverty of the people living in Area B may be why their levels of education are lower / may be the reason for their lower levels of education.

6. We occasionally observed the particles move slightly. This may have been because the air pressure fell.
(Hint: Use the nominalisations *movement* and *fall*.)
The occasional movements of the particles that we observed / The observed occasional movements of the particles may have been due to / because of a fall in air pressure.

7. If we can reduce the amount of plastic that we throw away, we will do less damage to the environment.
(Hint: The nominalisation from reduce is *reduction. Damage* is both a verb and a noun, so you do not need to change its form.)
Reduction of/in the amount of rubbish we throw away will reduce damage to the environment.

8. When we analysed the results we found that the scores of males and females were more or less the same.
(Hint: the noun from *analyse* is *analysis*. You will find it easier to use the noun *(no) difference* than trying to nominalise *same*.)
Analysis of the results found/showed no significant difference between the scores of males and females.

VOCABULARY PREPARATION

Read through Task 2 below and find the words and phrases that are explained in the following sentences. Then do the task.

1. Pedestrians are people who are walking, not travelling in a car or in a bus etc.
2. An application is a program (software) designed to be used on a mobile device such as a smart phone or a tablet. When we talk about an app, we usually pronounce just the first three letters of the word.
3. Cognitive is an adjective which means related to thinking.
4. When we react or respond appropriately (adverb) to an event, we react or respond in a correct, suitable or acceptable way.
5. If someone is at risk, they are in danger. There is a possibility that something bad will happen to them.
6. The impact of something is how big an effect it has.
7. Distraction is formed from the verb distract. When something distracts someone, it takes away their attention from what they were doing.

Task 3: Comparing the content of two introductions

Read through Text 2 below and discuss the following questions.

1. Is there any element in this text that does not occur in Text 1?

   Paragraph 3 following PR, describes an area of research that has NOT been done and which needs to be done. This is sometimes called "Identifying a Gap".

2. In Text 1, the aims of the research are expressed as direct questions. How are they expressed in Text 2?
   They are expressed as indirect questions and as a statement that is to be tested, i.e. hypothesis. 1.

3. Which element in Text 2 is much longer than in Text 1?
   Previous research (PR).

4. Overall, do you think Text 2 is a better introduction than Text 1. Why/why not?

   It seems that Text 2 is a better introduction than Text 1. Not only does it include much more information about previous research, it also identifies a gap in that research, which helps to justify the researchers' own choice of what to research.

Text 2

Texting can wait!

Introduction

As technology has improved, mobile phones have become a very important part of the lives of many Hong Kong people. They use mobile phones to connect with each other by texting, calling and using various **applications**. However, although mobile phones are very useful, when people use them, they may react to unexpected events more slowly. This can lead to dangerous situations.

According to Reed & Robbins (2008), texting increases a person's visual and cognitive load. Having a conversation on a mobile phone may also increase **cognitive** load and can narrow the user's visual scan (Richtel, 2010). Therefore, while using mobile phones, users may be less able to respond quickly and **appropriately** to sudden events.

Several studies have shown that using smartphones when driving can increase the chance of having an incident. A report by the Government of China stated that in 2014, 47.2% of road incidents in China were related to people using mobile phones when driving. Pedestrians using mobile phones can also be at risk. Jehle (2015) found that users were unable to control complex actions such as walking when they were texting on a mobile phone. Other research has also found that pedestrians using mobile phones have lower awareness and **distracted** attention (Hatfield and Murphy, 2007, Hyman et al., 2010). A statistical analysis conducted at Ohio State University (Richtel, 2010) found that from 2006 to 2008 four times more pedestrians visited a hospital emergency room due to phone-related accidents than due to other factors. Recent research done by Richards (2018) suggests that messaging on a mobile phone may be more distracting than talking on the phone.

Although many studies such as those cited above have been done on the effects of using mobile phones while driving or walking, little information is available on the effect of using a mobile phone on the reaction time of the user in general. Therefore, research in this area is needed.

The purpose of our research is to explore and analyze the impact of mobile phones on user reaction time and to discover whether texting or calling has the greater **impact** on reaction time. Our hypothesis is that texting will have the greater impact.

Task 4: Comparing grammar in the two introductions

Tense

A. Text 1 starts off using the simple present. In Text 2 , however, the first sentence uses present perfect. Why is this? If simple present were used instead, how would the meaning change? Would it be better to use simple present?

Present prefect is used in the first clause because the improvements in technology began at some time in the past and continue until now/the present. The same tense is used in the second clause because the change in the importance of mobile phones in Hong Kong people's lives also began or happened at some in the past and has resulted in mobile phones being very important now/in the present. If simple present were used as in *As technology improves, mobile phones become a very important part of people's lives* it would be a generalization about what happens anytime, anywhere.

B. Look at the ways previous research is referred to in paragraph three. As in Text 1, present perfect tense is used with verbs that report general conclusions based on a number of previous research studies.

1. Several studies have shown that using smartphones when driving can increase the chance of having an incident.

2. Other research has also found that pedestrians using mobile phones have lower awareness and distracted attention (Hatfield and Murphy, 2007, Hyman et al., 2010). (paragraph 3)

Other references to previous research use either simple present tense or simple past tense.

3. Jehle (2015) found that users were unable to control complex actions such as walking when they were texting on a mobile phone. (paragraph 3)

4. A statistical analysis conducted at Ohio State University (Richtel, 2010) found that from 2006 to 2008 four times more pedestrians visited a hospital emergency room due to phone-related accidents than due to other factors. (Line 18)

5. Recent research done by Richards (2018) suggests that messaging on a mobile phone may be more distracting than talking on the phone.

Can you suggest why the writers chose to use simple past in sentences 3 and 4 but simple present in sentence 5?

3&4 report specific findings from the past research. 5 reports a generalisation or general conclusion drawn from the research. If past tense were used it could hint that the writers have some doubt about Richard's suggestion.

Nominalisation

Like Text 1, Text 2 contains nominalisation (OR many nominalisations). We saw earlier that nouns formed by nominalisation are often followed by prepositional phrases and that these phrases commonly use the preposition *of* followed by what would be the object of the verb if the noun group were 'de-nominalised'. For example:

Careful investigation of all the data...

When we carefully investigated all the data.

However, in Text 2 there are some nominalisations in which the structure is a bit different. For example:

Having a conversation on a mobile phone ... (paragraph 2)

...using smartphones when driving ... (paragraph 3)

In these example, verb+*ing* forms are are followed directly by an object, not by an *of* prepositional phrase. We can do this because the Verb+*ing* form is still a bit like a verb in that it can have an object.

Some grammar books may call the first of these a complement. The terms do not really matter.
Also note that some grammar books may call these structures 'nominalised clauses' or "nominal clauses'.

Some students may be smart enough to notice that *conversation* is also a nominalisation formed from the verb *converse*. However, phrases with "empty" verbs like *have* and *take* followed by nominalisations, such as *have a conversation, have a talk, take a shower* and *take a walk* are very common even in informal speech and this kind of nominalization is not especially characteristic of scientific writing.

Rewrite the following sentences changing the underlined verbs into verb+*ing* forms with objects. The first one has already been done.

1. When we mix strong acid with water, a large amount of heat is released.
   Answer: Mixing strong acid and water releases a large amount of heat.

2. We played fast pop music to the participants. This caused their pulse rates to increase.
   Playing fast pop music to the participants increased their pulse rates.

3. When they tried to do all three tasks at the same time, many of the participants were confused.
   Trying to do all three tasks at the same time confused many of the participants.

4. If people use mobile phones while walking, is it really dangerous?
   Is using mobile phones while walking really dangerous?

5. They had to listen to one story and read another story at the same time. This was the most challenging task.
   Having to listen to one story and read another at the same time was the most challenging task.

6. We divided the participants into five groups. This enabled us to test five different procedures.
   Dividing the participants into five groups enabled us to test five different procedures.

Lesson 6: Drafting your introduction

Introduction

In this lesson we will look first at how you can refer to other people's research in your report. You will then be guided to write the first draft of your introduction. Although you will write your draft individually, each of you will asked to share your draft with your classmates and get comments from them.

Task 1: Referring to the work of others

.

When writing your report, it is important to tell the reader the source of any information you have got from other publications. We normally do this by mentioning in our text the surname(s) of the writer(s) and the date of publication of each of the articles or books that we got the information from. We then have to list full details of all these sources in a reference section at the end of the report.

Look at the following examples from Text 2 (Lesson 5). What are the different ways in which the authors' surnames and dates of publication are included in the text?

> According to Reed & Robbins (2008), texting increases a person's visual and cognitive load.
>
> Having a conversation on a mobile phone may also increase cognitive load and can narrow the user's visual scan (Richtel, 2010).
>
> Jehle (2014) found that users were unable to control complex actions such as walking when they were texting on a mobile phone.
>
> A statistical analysis conducted at Ohio State University (Richtel, 2010) found that from 2006 to 2008 four times more pedestrians visited a hospital emergency room due to phone-related accidents than due to other factors.
>
> Other research has also found that pedestrians using mobile phones have lower awareness and distracted attention (Hatfield and Murphy, 2007, Hyman et al., 2010).

According to SURNAME (DATE),

SURNAME (DATE)

(SURNAME, DATE)

Which of the above forms would it be best to use if use if you are not certain that the information you are reporting is correct?

According to SURNAME (DATE)

Now look at the full references as they appear in the reference section at the end of the report from which this introduction is taken

- What is added to the surnames of the authors?
  Initials of their first and middle names. This is of course not the only form names can take in references, but it is one of the most common.
- Which parts of the references are the titles of the articles and which parts are the names of the journals or newspaper in which the articles were published?
  The titles of the articles are in ordinary type and follow the authors' names and publication dates. The names of the journals follow the titles of the articles and are in italics.

One reference is to an online source. Note how the online source is given using the URL (web address).

In fact, this reference to an online source is inaccurate. Check it for yourself. What is wrong with the way Jehle's comments are reported and referenced in Text 2?

Jehle is quoted in this article but the author of the article is Marcene Robinson not Jehle himself. One could write in the text: *Jehel found that users were unable to control complex actions such as walking when they were texting on a mobile phone (as reported in Robinson, 2014).* Then change the name in the reference list to Robinson, M.

References

Hatfield, J., & Murphy, S. (2007). The effects of mobile phone use on pedestrian crossing behaviour at signalised and unsignalised intersections. *Accident Analysis and Prevention, 39*, 197–205.

Hyman, I.E., Boss, S.M., Wise, B.M., Mckenzie, K.E., & Caggiano, J.M. (2010). Did you see the unicycling clown? Inattentional blindness while walking and talking on a cell phone. *Applied Cognitive Psychology, 24*(5 , 597-607.

Jehle, D. V. (2014). Think it's safe to type a quick text while walking? Guess again. *UBNow.* Retrieved from http://www.buffalo.edu/ubnow/stories/2014/February/texting_walking.html.

Reed, N. & Robbins, R. (2008). The effect of text messaging on driver behavior: a simulator study. *Accident Analysis and Prevention, 50*, 122-129.

Richtel, M. (2010, January 16). Driven to distraction: Forget gum. Walking and using phone is risky. *The New York Times*, p. A1.

Task 2: Writing the first draft of your introduction

A. Preparation

Before beginning to write your individual drafts, discuss with your group the following questions.

1. How are you going to introduce the phenomenon that is the topic of your research?
    - Are you going to define it?
    - Are you going to make some generalisations about it?
2. Do you need to narrow down the general phenomenon to a more specific phenomenon or issue?
3. Are you going to say anything about why it is important, necessary or useful to do research on this phenomenon?
4. What have you found about previous research done on this phenomenon? Do you need to find more information on this?
5. What are your hypotheses or research questions?

B. Writing

Now write your first draft. If possible type it into google docs or a similar application so that you can easily share it with your group mates and with your teacher.

Don't worry about getting every word correct, but try to make sure you include all necessary content in a logical order. If there is information that you still need to find (for example references to previous research) just indicate in your draft where you will put the information when you have found it.

C. Commenting and checking

The members of each group should now read through the drafts of all their fellow group members. Consider the following questions and give one another feedback.

1. Are there any elements missing?
2. Are there any elements that need expanding?
3. Does every sentence have at least one finite clause?
4. Does every finite verb have a subject?
5. Are appropriate tenses used?
6. Is nominalisation used correctly and appropriately?
7. Is all the information that has been taken from somewhere else properly referenced?

D. Editing your draft

When you have received your group mates' comments, make any changes to your own draft that you think are necessary. Don't worry if it is still not complete or "perfect". You will have time to work more on it before you need to submit it.

Students should be encouraged to write whatever they can and not to be shy about sharing it and responding to suggestions from their classmates and from the teacher. It is only a first draft of the introduction to their report and they will not be judged on it.

Lesson 7: Explaining how the research was carried out

Introduction

The methods (sometimes called methodology) section of a scientific report explains how you did your research. In other words, it tells readers how you got the data that you used to try to answer your research questions or test your hypotheses. It also usually explains how you analysed the data.

A methods section should include enough information about how you carried out your research so that readers can feel sure that the results you report are likely to be valid. Valid results are results that are reliable because they are based on good evidence and good reasons. This section should also explain what you did clearly enough so that other researchers can use the same methods themselves to research the same or a similar phenomenon.

In this lesson you will first examine a methods sections from a research report written by university students. In the second task you will be asked to write a methods section yourself based upon a set of instructions.

VOCABULARY PREPARATION

Read through Task 1 below. Find the words that are in bold type and use these words to complete the following sentences.

1. Aware is an adjective. If you are aware of something you know about it.
2. When you record something, you keep a record (same spelling but a different syllable is stressed) of it in order to remember it. This record may be in the form of writing, or it may be audio (sound) or video.
3. When you do something at random, you do it without a definite plan or you do it without following a specific pattern.
4. The location of something is the place where it has been put, or where it can be found.
5. The capacity of something is the largest amount that it can contain.

TEXT ONE

Methods

a. In order to find out how **aware** students are of the waste problem at the university, 10 students chosen **at random** were interviewed.
b. The bins were checked from time to time and the total volume of rubbish inside them was measured and **recorded**.
c. Bin 1 was at the entrance to the canteen, bin 2 was near the lift on the ground floor and bin 3 was near the exit to the university concourse.
d. Each of the students was asked to answer questions and the interviews were audio-recorded for the later analysis.
e. The **capacity** of each bin was recorded using a tape measure.
f. In order to estimate the amount of rubbish produced every day by students at the university, three bins at different **locations** within one academic building (AC1) were selected.

The most logical order for the above sentences is:

1. f
2. c
3. e
4. b
5. a
6. d

This was the original order. Some students may suggest adfceb, which would also be possible.

1. Text one above is a list of six sentences that come from the methods section of a research report on rubbish disposal at a Hong Kong university. The sentences are out of order. Arrange them according to what seems to be the most logical order.

2. The original text had two paragraphs. Where could the paragraph break be?

   The paragraph break is after sentence b. The first 4 sentences are about measuring the amount of waste, and the last two sentences are about investigating the level of students' awareness.

3. Find the sentence in which the writers use the verb *estimate*. How would the meaning be different if the writers had used the verbs *find* or *discover* instead of *estimate*?

   If the writers had used the verbs 'find' or 'discover' they would be claiming that their measurements of the amount of waste in just 3 bins "from time to time" enabled them to know exactly how much rubbish was produced every day on the whole campus, which would not be reasonable.

4. All the verbs in this section are in past tense except in one sentence. Which sentence? Why are the verbs in this sentence not in past tense? Would it be possible to use past tense? What difference would it make?

   In order to find out how aware students are of the waste problem at the university. The use of present tense generalises the findings to include the current batch of students. Use of past tense implies that the findings could tell us about the levels of awareness only of students at the time the research was carried out.

5. All the clauses in the text that describe what the researchers did, are passive voice clauses using passive voice verb forms. For example:

   1. *Three bins at different locations within one academic building (AC1) were selected.*
   2. *The capacity of each bin was recorded using a tape measure.*
   3. *10 students chosen at random were interviewed.*
   4. *Each of the students was asked to answer questions.*

Try changing these passive voice clauses into active voice clauses. More than one researcher was involved in this research, so the subject of the active voice clauses will be "we". Make sure that although you change the voice of these clauses, the tense will still be simple past.

1. We selected three bins at different locations within one academic building.

2. We recorded the capacity of each bin by using a tape measure.

3. We interviewed 10 students chosen at random.

4. We asked each of the students to answer questions.

In order to check for yourself that you are clear about the differences between the forms of active and passive voice sentences, cover up the four **passive** clauses from the text above, and rewrite the **active** voice clauses that you just wrote as passive voice clauses. Compare your passive voice sentences with the original sentences.

Use of active and passive voice

In the past, students learning to write scientific English were usually advised to use passive voice in writing the methods sections of research reports. However, these days scientists often also use active voice when describing their methods. If you use active voice, the text seems a little more personal and a little less formal. Of course, whether you use active voice or passive voice, your verbs should be in past tense, because when you write your final report you will have already finished the research.

Sometimes, writers may mix the two voices, for example:

> *We selected 20 secondary school students to take part in our study* [ACTIVE]. *The students were first given a questionnaire to fill out [PASSIVE]. They were then asked to do task one [PASSIVE].*

This switching from active to passive works well. Using active voice in the first sentence makes it clear who the researchers were – the authors of the report - and introduces the students. After that there is no need to mention the researchers and the following sentences in passive voice are all about the students and what they were asked to do. However, switching between active and passive voice needs to be done with care. If you are in any doubt, it is best to choose either active voice or passive voice to write your methods section, and to keep the same voice all the way through.

VOCABULARY PREPARATION

Read through Task 2 below. Find the words that are in bold type and use these words to complete the following sentences.

1. The noun concentration is related to the verb concentrate. When you concentrate on something, you pay full attention to it without thinking about anything else.
2. The noun accuracy is related to the adjective accurate. Something that is accurate is true or correct.
3. The subjects of research are the people who are researched, i.e. the people who you get data from by interviewing them or asking them to do things. Often scientists prefer to use the word *participants* instead of subjects, as this makes it clearer that the people are taking part in the research themselves rather than just been observed or experimented on.

Task 2: From instructions to methods

1. Text Two below is a set of instructions for doing research into the effect of chewing gum on **concentration.** Imagine that you have done this research and are now writing a research report about it. Use the instructions below as the basis for writing the methods section of your report. Write the methods using the personal, less formal style.

You can number each step as is done in the instructions or you can write this section as one or two paragraphs. If you write it as paragraphs, you may need to add some sequencers, such as *first, then* and *after that.* Also note that you will need to find a way to change the questions in steps 6 & 8 into indirect questions and to include them in the sentences describing these steps. If you have difficulty doing this, look back at the text in Task 1 and find where the writers talk about the purposes of doing particular steps.

Begin *We recruited …*

A sample answer

We recruited 8 male subjects of roughly the same age and divided them into two groups. We asked 4 members of the first group to play the memory game at https://www.webgamesonline.com/memory/index.php 5 times. We recorded how long it took each subject to complete each game. We then gave some chewing gum to the 4 members of the second group and asked them to play the same memory game 5 times while chewing the gum. Again, we recorded how long it took the members of the group to finish each game. We analysed the results to see/discover if/whether chewing gum [had] increased the participants' speed and accuracy in the memory game. We repeated the procedure with 8 female subjects of roughly the same age. We then analysed the results to see/discover if/whether gender had made / made any difference to the participants' speed and accuracy in the game.

TEXT TWO

Chewing Gum and Concentration

1. Find 8 male **subjects** of roughly the same age and divide them into two groups.
2. Ask the 4 members of the first group to play the memory game at https://www.webgamesonline.com/memory/index.php 5 times.
3. Record how long it takes each subject to complete each game.
4. Give the 4 members of the second group some chewing gum and ask them to play the same memory game 5 times while chewing the gum.
5. Record how long it takes members of this group to complete each game.
6. Analyse the results. Did chewing gum increase the subjects' speed and **accuracy** in the memory game?
7. Now repeat the procedure with 8 female subjects of roughly the same age.
8. Analyse the results. Did the gender of the subjects make any difference to their speed and accuracy in the game?

2. Now rewrite the methods section you just wrote using the less personal, more formal scientific style.

Begin: *Eight male students of roughly the same age were recruited...*

A sample answer

Eight male subjects of roughly the same age were recruited and divided into two groups. The first group was/were asked to play the memory game https://www.webgamesonline.com/memory/index.php 5 times. The time / length of time each subject took to complete each game was recorded. Chewing gum was then given to the members of the second group and they were asked to play the same game 5 times while chewing the gum. The time / length of time each subject took to complete each game was again recorded. The results were analysed to see/discover if/whether chewing gum increased / had increased the subjects' speed and accuracy in playing the memory game. The procedure was repeated with 8 female subjects of roughly the same age to see/discover if/whether gender had made / made any difference to the subjects' speed and accuracy in playing the game.

3. Share both the versions that you have written with your classmates and give one another feedback. Think about the following.

- Is every step of the methods included?
- Are the right tenses used?
- Are the forms of the active voice clauses and the passive voice clauses correct?
- Are the questions in steps in steps 6 and 8 appropriately included?

Task 3: Reviewing your progress in data gathering

Use any time left in this lesson to review the progress of your group in collecting data.

- How many interviews have you done?
- How many participants have taken part in your experiments?
- What problems or difficulties have you faced?
- Do you need to change any of your methods?
- If for any reason your group has not collected any data. Please ensure that each member conducts at least one interview and has at least one participant do the experiment before the next lesson.

Lesson 8: Drafting your methods section

Introduction

In this lesson you will write the first draft of your methods section. Although you will write your draft individually, you will be asked to share your draft with your classmates and get comments from them.

Before you begin writing, there are some tasks for you to do in order to review what content you need to include and what language forms you will use.

Task 1: Preparing the content

Discuss with your group the following questions.

1. What information do you need to provide about the participants in your interviews and experiments? (E.g. age? gender? educational level?)
2. What information do you need to provide about how you recruited your participants?
3. What information do you need to include about any equipment or online resources you used?
4. What information do you need to provide about the questions you asked your participants?
5. How many steps are there in your experimental procedure and in what order should they be?
6. What information do you need to provide about how you analysed your results?

Task 2: Reviewing the use of tense and voice

Discuss with your group the following questions.

1. What is the main tense you will use in writing this section?
2. Is there any place in this section where you might use a different tense?
3. What voice (active or passive) will you mainly use in writing this section?
4. Is there any place where you might use a different voice?

Task 3: Using articles and pronouns to track people and things

We use articles and pronouns to keep track of the people and things we mention in a text. The following exercise is designed to remind you of some of the ways that you can do this in your methods section.

Fill in the gaps in the following text with i) a noun with no article (e.g. *water, students*), ii) a noun with an article (e.g. *the water, the students, a student*), or iii) a pronoun (including demonstrative pronouns) (e.g. *it, this, they, these*). Note that in some places more than one form may be possible. Be prepared to explain why you chose one form rather than another.

> Forty students from the university were recruited as participants in the interviews and experiments. The students / The participants /They were aged between 17 and 23, as shown in Table 1. During the interviews, 11 questions were asked, ranging from questions about their opinions on certain situations related to the use of mobile phones.
>
> After completing the interviews, the students were invited to participate in a reaction time (RT) test. To measure the RT of the participants, an online reaction time test, the *Humanbenchmark Reaction Time Test* (see Appendix 1) was used. The participants/They were required to take the test three times, each under different conditions. They were required first to touch the blue screen to start the test, then to wait for the red screen to turn green and touch the screen again. The procedure was repeated 4 more times. For the first trial, which was the control, the participants were asked to do the test without distraction (i.e. without texting or making a call). During the second trial, the the participants were asked to text with both hands while doing the test / it. During the last trial, participants were on a phone conversation while doing the test with one hand.

Task 4: Writing the first draft of your methods

A. Preparing to write

Make sure you have with you all the information you discussed in Task 1 above. Also think about what tenses and voices you will be using.

B. Writing

Now write your first draft. If possible, type it into google docs or a similar application so that you can easily share it with your group mates and with your teacher.

Don't worry about getting every word correct, but try to make sure you include all necessary content in a logical order.

C. Commenting and checking

The members of each group should now read through the drafts of all their fellow group members. Consider the following questions and give one another feedback.

- Is there anything missing?
- Are there any parts that are not clear?
- Are there any parts that need expanding (= making longer)?
- Does every sentence have at least one finite clause?
- Does every finite verb have a subject?
- Are appropriate tenses used?
- Are appropriate voices (active or passive) used?
- Are articles and pronouns used appropriately to track people and things through the text?

C. Editing your draft

When you have received your group mates' comments, make any changes to your own draft that you think are necessary. Don't worry if it is still not complete or "perfect". You will have time to work on it again later.

Task 5: Pooling and analysing your results

Use any time left in this lesson to pool (put together) all the results your group has collected and if possible begin analysing the results.

Lesson 9: Presenting and Describing Results

Introduction

In the results section of your report you need to display and describe the results of your research. Very often your results will be in the form of numbers, and you can display these using various kinds of graphs or tables. You will also need to describe your results in words, drawing attention to the most important, interesting or surprising findings.

In this lesson, you will look at ways of displaying and describing results using two different kinds of graphs. You will also practice describing some results yourself.

VOCABULARY PREPARATION

Read through Task 1 below. Find the words that are in bold type and use these words to complete the following sentences.

1. Deposit is a relatively formal verb. When we deposit something we put it down somewhere or leave it somewhere.
2. Gradually is an adverb. When something happens gradually, it happens slowly, or bit by bit.

Task 1: Reading a description of trends

Sometimes we may need to report results showing trends, i.e. how a situation changes over time. A common way to do this is to use a line graph.

Here is a simple line graph followed by a short description of what it shows. Take a look at the graph and the description below it and answer the questions below them.

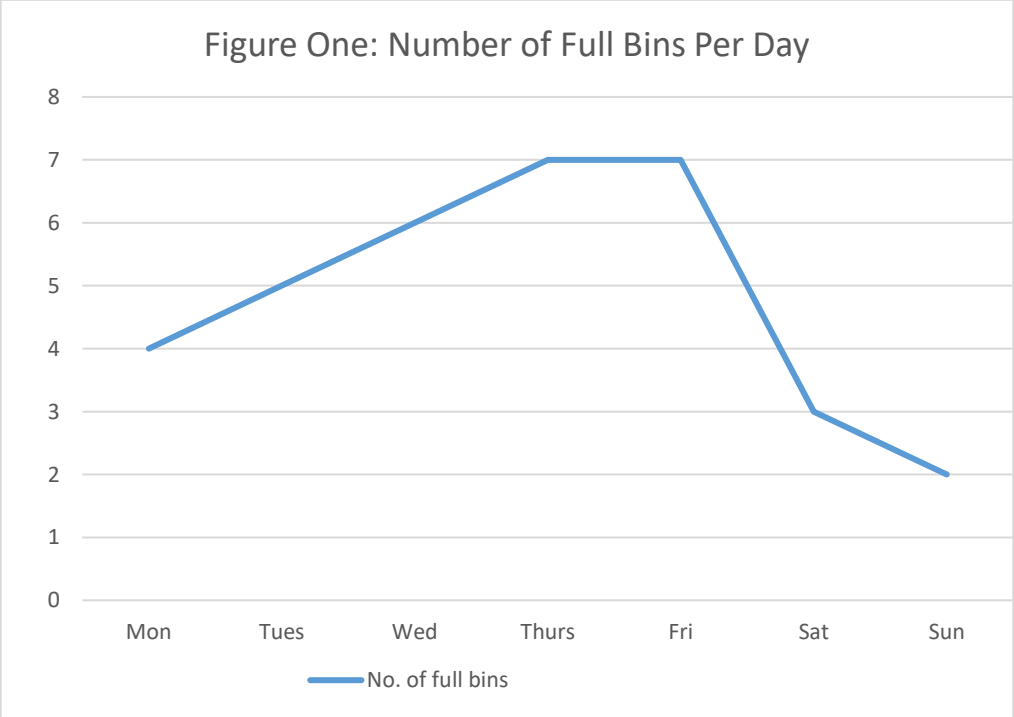


Figure 1 shows the number of bins on the campus found to be full of rubbish at the end of each day of the week. The amount of rubbish **deposited** increased **gradually** from Monday to Thursday. On Friday, roughly the same amount of rubbish was deposited as on Thursday. The amount then fell sharply on Saturday, and further decreased on Sunday.

1. What does the horizontal axis show?

   It shows the day(s) of the week.

2. What does the vertical axis show?

   It shows the amount of rubbish deposited./ Number of bins filled

3. "...found to be full of rubbish ..." Who found the bins to be full of rubbish?

   The people who carried out the research.

4. Why is it "number of bins" but "amount of rubbish"?

   Bin is a countable noun; while rubbish is an uncountable noun.

5. "Increased" is the opposite of "decreased". What would be the opposite of "fell"?

   The opposite of "fell" is ''rose''.

6. All the finite verbs are in past tense except the first one ("shows"). Why is this in present tense?

   The verb ''shows'' is in present tense because it refers to the diagram in the text not directly to what the researchers did in the past

   Which words in the description could you replace with "slowly" and "suddenly" without greatly changing the meaning?

   ''Slowly'' can replace ''gradually'' while ''suddenly can replace ''sharply''.

Task 2: Exploring vocabulary and grammar for writing about trends

Here are some verbs that can be used to describe trends. Check that you know what they all mean. Which indicate that something goes up/gets more? Which indicate that something goes down/gets less? Which indicates that it does both? √

VERB	UP	DOWN	BOTH
increase	√		
decrease		√	
shrink		√	
expand	√		
drop		√	
fall		√	
rise	√		
fluctuate			√
decline		√	

Look at the following rewriting of one clause from the text in Task 1.

Original text: *The amount of rubbish deposited increased gradually from Monday to Thursday...*

Re-written text*: From Monday to Friday there was a gradual increase in the amount of rubbish deposited...*

The verb *increased* in the original sentence has been nominalised as the noun *increase* in the second sentence. What other words have changed their parts of speech?

The adverb *gradually* has changed to the adjective.

Try rewriting the following sentence (two clauses) in the same way.

> *The amount fell sharply on Saturday, and further decreased on Sunday.*
>
> There was a sharp drop/fall in the amount on Saturday and a further/additional decrease on Sunday. Note that *further* has the same form as adverb and as adjective.

The verbs that can be used to describe trends are listed again in the table below. Check that you know how to use these verbs in the past tense and how to change them into nouns. Then complete the table. Note that most, but not all, of them have the same forms as verbs and nouns. If you are not sure, check in a dictionary.

VERB	PAST TENSE	NOUN
increase	increased	increase
decrease	decreased	decrease
shrink	shrank	shrinkage
expand	expanded	expansion
drop	dropped	drop
fall	fell	fall
rise	rose	rise
fluctuate	fluctuated	fluctuation

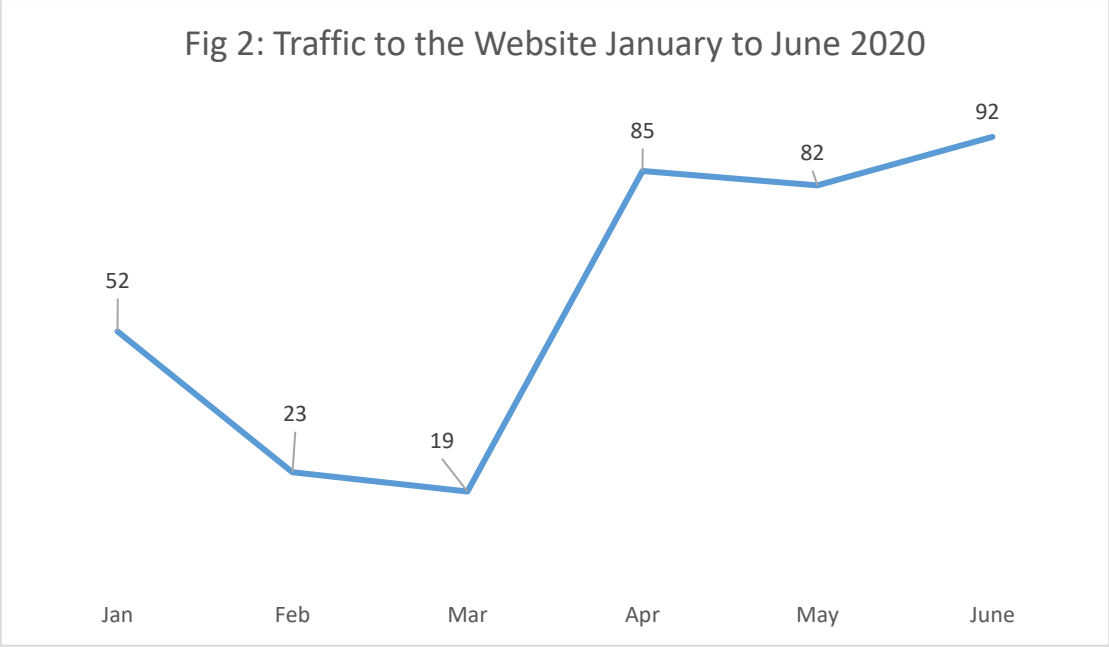
Two adverbs, *gradually* and *sharply*, are used in the text in Task 1. They indicate whether the change in the amount of rubbish deposited was slow or fast. As we saw above, the adjective forms, *gradual* and *sharp*, have to be used before the nouns *increase* and *fall*. Here are some more adverbs/adjectives that can be used to describe changes. Check that you know the meaning of all of them. Which of them say something about the speed of change, and which of them say something about the amount of change?

slightly/slight, steadily/steady, rapidly/rapid, hugely/huge, steeply/steep, suddenly/sudden

Speed of change	steadily/steady, rapidly/rapid, steeply/steep, suddenly/sudden
Amount of change	slightly/slight, hugely/huge

Task 3 : Writing a Description of Trends

Write a description of the results displayed in the following line graph, which shows trends in the number of visitors to a certain website during its first six months online after it was launched in January 2020.



Sample answers

Figure 2 shows the number of visitors to the website in the first six months after it was launched in January 2020. There was a total of 52 visitors during the first month, followed by a significant drop/fall in the number of visitors in February and a further decline to a low of 19 in March. The number then rose steeply / suddenly increased / soared to 85 in April. There was a slight dip/reduction/fall in May, before the numbers rose again to a high of 92 in June // The number of visitors dropped/fell /shrank slightly in May before rising to 92 in June. / and then rose to 92 in June.

Figure 2 shows the number of visitors to the website in the first six months after its launch in January 2020. The website received 52 visitors in the first month, after which the number of visitors fell sharply to 23 in February and declined/fell further to 19 in March. There was then a sharp increase to 85 visitors in April. After a slight decline in May, there was a rise to a high of 92 visitors in June.

VOCABULARY PREPARATION

Read through task 4 below and find the words and phrases that are explained in the following sentences. Then do the task.

1. Significantly is an adverb formed from the adjective significant. Something that is significant is big enough or great enough to be considered important or worth noting.
2. The location of something is the place where it can be found or where it has been put. The noun location is related to the verb locate.
3. Recyclable is an adjective that describes something that has been used but can be processed so that it can be used again.

Task 4. Exploring ways of comparing of results

Bar graphs are useful for comparing results. Here is a bar graph displaying some results from a study of **recyclable** rubbish disposal on the campus of a Hong Kong university. Look at the graph, read the description below it and answer the questions.

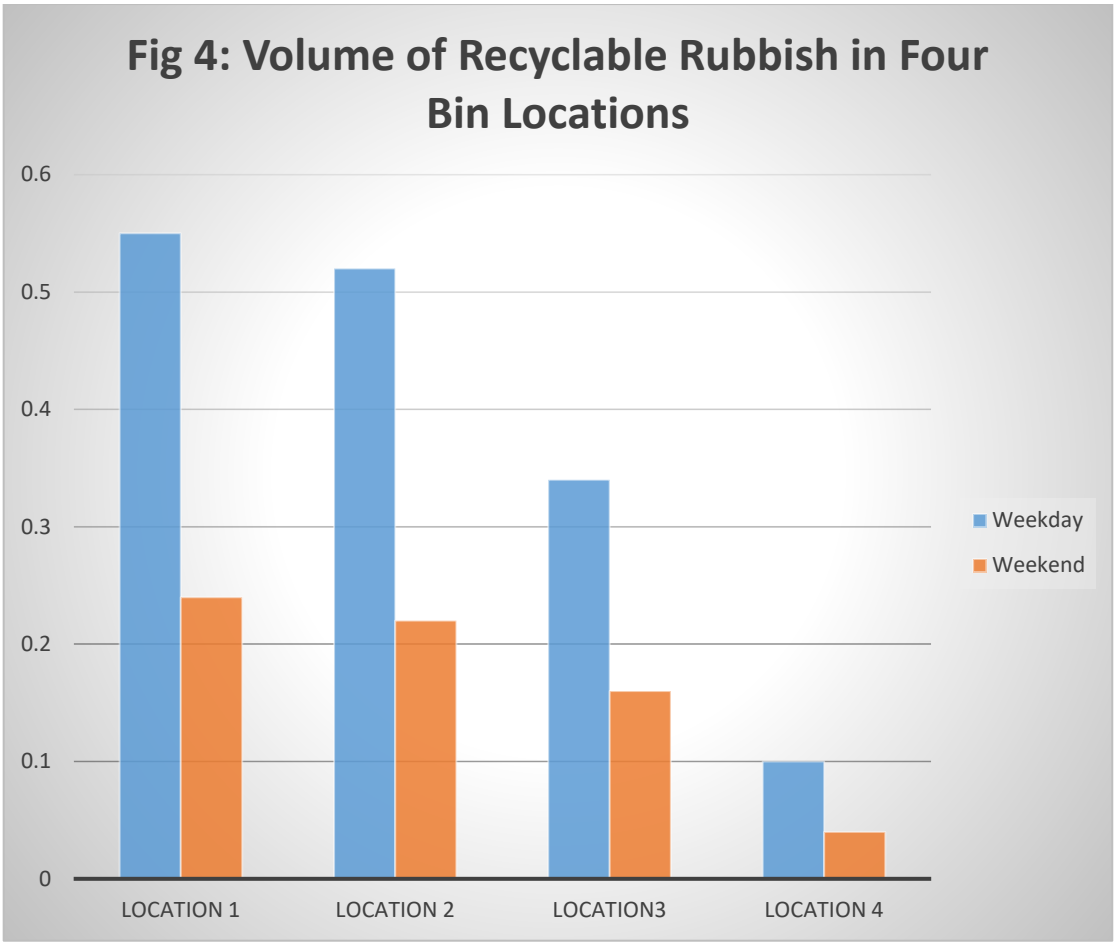


Fig. 4 shows the average daily volume of recyclable rubbish deposited in recycling bins at four different **locations** on weekdays and at the weekend. The bins at location 1 contained the highest volume of recyclable rubbish followed by those at location 2. In the bins at both these locations, the volume reached an average of over half a cubic meter (0.55m^3) on weekdays. The volume in the bins at location 3 was **significantly** lower than in the bins at locations 1 and 2 and the bins at location 4 contained the lowest amount of recyclable rubbish. The graph also shows that at all the locations more than twice as much recyclable rubbish was deposited on weekdays as at the weekend.

1. How often did the researchers record the volumes of rubbish and how did they analyse the numbers they recorded? Which two words in the first sentence give us the answers to these questions?

   The volume of the rubbish was recorded on a daily basis// Every day
   They divided the total amount of rubbish by the number of days. // They worked out the average amount of rubbish per day.
   The words ''daily'' and ''average''.

2. Why are two different colours used in the bars?

   The bars in blue show the rubbish collected on weekdays; while the orange bars show the rubbish collected at the weekends.

3. What does m^3 mean? It means cubic metres /meters
4. Complete the following five sentences about the above results with phrases using forms of the adjectives *low* and *high*. If you have any doubt, look back at how these adjectives are used in the text.
   a. 0.55 was the highest average daily volume of rubbish recorded.
   b. 0.04 was the lowest. average daily volume recorded.
   c. On weekends, at locations 3 and 4, average daily volumes lower than 2 cubic meters were recorded.
   d. On weekdays, at locations 1 and 2, average daily volumes higher than 5 cubic meters were recorded.
   e. At every location, the average daily volume recorded on weekdays was about twice as high as / much higher than at the weekend.

Here is some data from research into how people rated other people's levels of intelligence on a scale of 1 to 10 based only on hearing recordings of them speaking.

Average ratings of intelligence (1 -10) for 6 speakers (S1 -S6) based on the recordings

S1: 8.1 S2: 4.3. S3: 6.2. S4 :8 S5: 5.4. S6: 4.2

Based on the above data, complete the following sentences making comparisons as indicated. Use the adjective *intelligent*.

a. (S1 compared to all the other speakers)
Speaker 1 was judged to be the most intelligent of all the speakers.

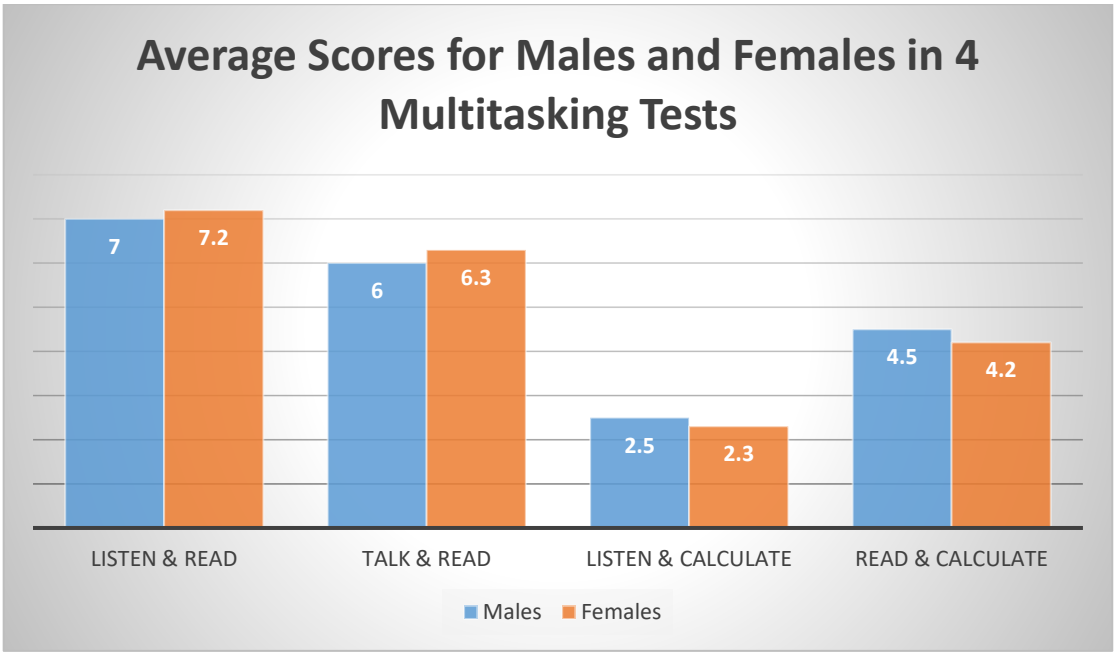
b. (S6 compared to all the other speakers)
Speaker 6 was judged to be the least intelligent of all the speakers.

c. (S1 compared to S6)
Speaker 1 was judged to be much more intelligent than speaker 6.

d. (S4 compared to S1)
Speaker 4 was judged to be slightly less intelligent than speaker 1 /almost as intelligent as speaker 1

Task 5. Writing comparisons of results

Write a description of the results displayed in the following bar graph. Note that the maximum possible score for each test was 10.



Sample answers

The above figure shows the average scores for males and females in four multitasking tests. In the listen & read / listening-while-reading test, the female participants scored 7.2, which was slightly higher than the male participants' score of 7.0. / which was just .02 higher than the score of the male participants // In the listen & read / listening-while-reading test, the females did slightly better than than the males. In the talk & read test / talking-while-reading test, the female participants again / similarly scored slightly higher than the male participants.// did slightly better than the males. However, in the listen & calculate / listening while calculating test and the read & calculate / reading while calculating test, the males scored slightly higher than the females.// the males did slightly better than the females. Both males and females scored lowest in the listen & calculate / listening-while-calculating test.

Note: It is possible that some of the differences between male and female scores in a study like this would not be statistically significant. With students who have studied statistics, the teacher might like to point this out, and ask the students how they would test for statistical significance. Of course, they can't actually do this here as the all the individual scores are not provided.

Lesson 10: Drafting your results section

Introduction

In this lesson you will write the first draft of your results section. Although you will write your draft individually, you will be asked to share your draft with your classmates and get comments from them.

Before you begin writing, there are some tasks for you to do in order to review what content you need to include and what language forms you will use.

Task 1: Preparing the content

Discuss with your group the following questions.

1. Has everyone finished collecting data?
2. What analyses of the results still need to be done?
3. So far, what are the most interesting or surprising results?
4. What are the best ways of displaying your findings (e.g. tables, line graphs, bar graphs)?

Task 2: Reviewing grammar and vocabulary

1. How many verbs can you remember that can be used to describe trends （e.g. *increase*）?

   increase, decrease, change, shrink, expand, drop, fall, rise, climb, decline, fluctuate
2. Brainstorm some adjectives you might need to use in order to compare results. Check that you know their comparative forms (e.g. *lower*, *more accurate*) and their superlative forms (e.g. *the lowest*, *the most accurate*).
3. Complete the sentences below describing the given pairs of numbers. Use the following words and patterns. Better students need not be confined to using these patterns.

   - the adjectives *high* and *efficient*
   - *more* ADJECTIVE *than*
   - ADJECTIVE-*er than*
   - *as* ADJECTIVE as
   - *twice as* ADJECTIVE *as*
   - the adverbs *slightly, much, nearly*

   The first one has been done.

   a) A =12 B = 13
   High: Answer: B is slightly higher than A.
   Efficient: B is slightly more efficient than A.

b) C = 14 D = 7
High: C is twice as high as D.
Efficient: C is twice as efficient as D.

c) E = 14 F= 15
High: E is nearly as high as F.
Efficient: E is nearly as efficient as F.

d) G = 5 H = 14;
High: H is nearly three times as high as G.
Efficient: H is nearly three time as efficient than G.

e) I = 20 J = 20
High: I is as high as J.
Efficient: I is as efficient as J.

4. What tenses are you likely to use when writing this section?
Most likely past tense in describing the findings themselves /what actually happened during your research. Present tense in saying what diagrams show/represent etc.

Task 2: Writing the first draft of your Results

A. Preparing to write

When your group has finished pooling your results and has done enough analysis to have something to report, select the results you will report, decide on the order in which you will report them and how you will report them.

B. Writing

Now write your first draft. If possible, type it into google docs or a similar application so that you can easily share it with your group mates and with your teacher.

Don't worry about getting every word correct, but try to make sure you include all necessary content in a logical order. Note that to create a graph in google docs you need to select *insert* > *chart* > *bar/column/line* (depending on the kind of graph you want). Then click on the graph that will appear in your document and select *open source* from the menu in the top right-hand corner of the graph. Then just enter your data into the source file. If you are not yet ready to do this or are unable to do it, just write a note about the kind of graph you plan to create and what the vertical and horizontal axes will show.

C. Commenting and checking

The members of each group should now read through the drafts of all their fellow group members. Consider the following questions and give one another feedback.

- Are there any results missing?
- Are there any parts that are not clear?
- Is the data described accurately?
- Are appropriate graphs used?
- Does every sentence have at least one finite clause?
- Does every finite verb have a subject?
- Are appropriate tenses used?
- Are comparative structures used correctly?
- Are articles and pronouns used appropriately to track people and things through the text?

D. Editing your draft

When you have received your group mates' comments, make any changes to your own draft that you think are necessary. Don't worry if it is still not complete or "perfect". You will have time to work on it again later.

Lesson 11: Discussions and Conclusions

Introduction

Once you have presented your results, you need to move on to the final two sections of your report, the Discussion and the Conclusion. Without these sections, it may be hard for other scientists to know what is worth paying attention to in your results or whether they have any value at all.

The main purpose of the Discussion section is to tell the readers what you think your results mean. It normally draws attention to which of the findings seem to be important, interesting or surprising and states how they relate to the hypotheses the researchers started with. It will also usually attempt to explain all or some of the results.

The Conclusion section sums up what the researchers want other scientists to 'take away' from their research. It usually briefly summarizes the most important or interesting things about your research and suggests some ***implications*** *or* ***applications*** *of the findings. It may also make some* ***recommendations*** *about what should be done based on the findings. In some cases, the conclusion may also say something about the limitations of the research and give suggestions for further research.*

VOCABULARY PREPARATION

Read through Introduction below. Find the words that are in bold type and use these words to complete the following sentences.

1. Implication is a countable noun. It is related to the verb imply. When results imply something, it means that because of the results, something else is likely to be true.
2. Application is a countable noun. It is related to the verb apply. When we apply results, we make use of them in some way, for example to help us solve a problem.
3. Recommendation is a countable noun. It is related to the verb recommend. When we recommend an action, we suggest that it should be done.

VOCABULARY PREPARATION

Read through Task 1 below. Find the words that are in bold type and use these words to complete the following sentences.

1. Unexpected is an adjective formed from a verb. We use this adjective to describe something that happens that we did not think would happen, i.e., something that surprises us. The opposite of this adjective is expected.
2. When something is notable, it is important, interesting and worth paying attention to.
3. When we react to something that happens, we behave in a certain way because of what has happened. The noun related to react is reaction.
4. Motor is an adjective that describes anything to do with moving. It is also commonly used as a noun to refer to machines that turn power (usually from oil, gas or electricity) into movement.
5. When we underestimate something, we make an approximate or rough calculation of

Task 1: Examining a sample discussion and conclusion

Read the following discussion and conclusion sections from a research report and answer the questions that follow them. Note that each sentence has been numbered to help you answer the questions.

Discussion

(1) As the data from the interviews show, people rely on mobile phones for many purposes, and they believe that they need to use them in public areas in order both to keep up with their work when they are away from their workplaces, and to keep in contact with their friends and family. (2) This may be why people continue to use their mobile phones in public areas even though they know that when they are looking at their phones, or talking on their phones, they may **react** more slowly to **unexpected** events.

(3) It is **notable** that about half the interviewees thought that they could multi-task effectively using mobile phones. (4) However, the results of the experiments show clearly that their ability to focus on other tasks while using their mobile phones was greatly reduced.

(5) The findings from the experiments also show that texting has the greatest effect on reaction times. (6) This can be explained with reference to research by Reed and Robbins (2008) that shows how texting increases **motor**, visual and cognitive demands much more than simply talking on the phone, or looking at the screen.

Conclusion

(7) Although most people understand that using mobile phones can influence their reaction times, they greatly **underestimate t**he danger of using a mobile phone while walking or driving, and they are not aware of how a few seconds longer reaction time can make it much harder to avoid accidents. (8) It is important to find ways to make the general public more aware of the dangers of using mobile phones in public places, and especially the danger of texting.

1. Why do you think the writers use the phrase "It is notable" at the beginning of paragraph 2? Do you agree that the findings reported in this paragraph are "notable"?

   The findings are notable because they suggest that there is a contradiction between how well people think they can multitask and how well they can actually multitask.
2. Find the sentence in the Discussion where the writers suggest an explanation for some of their findings. Does this seem to you to be a good explanation?

   Sentence 6. Yes, if texting requires us to use three kinds of skills simultaneously, then it is likely than our reaction times will be slower.

3. Find the sentence in the Discussion where the writers say that their findings could explain something else. How certain are they of this? Which word tells you how certain they are?

Sentence 2. It is just a suggestion / They are not certain. We know this from the use of "may".

4. Find the sentence in the Conclusion that expresses a general implication of their findings.

   Sentence 7

5. Find the sentence in the conclusion that makes a recommendation based on their findings. Which phrase makes it clear that it is a recommendation?

   Sentence 8. "It is important to ..."

6. What is the main tense used in both the Discussion and the Conclusion?

   Present tense

7. Past tense is used once. Why is it used? Could present tense be used instead?

   "thought" in sentence 3. This sentence refers to a specific result obtained during the research. It is not a generalised conclusion or implication from the research. It would be a little odd, though not impossible, to use present tense.

Task 2: Making claims about your results

In the Discussion and Conclusion sections, when you talk about how your results or findings relate to your hypotheses, you are making claims. When scientists make claims based on their research, they always do so carefully, taking care not to exaggerate. When you are talking about your own results, you should also be careful about the claims that you make. You will often need to choose words and phrases that "soften" the claims. Even when you think that the results are clear, you should avoid making claims that are too strong. For example, instead of saying that the results of your research 'prove' that a hypothesis is true, you can say that they 'support' it. Similarly, instead of saying that the findings "show" that something is the case, you can say that they "suggest" that something is the case.

Look at the sentences below. They are all about how the results from research into use of mobile phones either support or do not support one of the hypotheses of the study. Look at the wording of each group of three sentences and rank (order) the three sentences according to how much the writers soften their claim, i.e. how much certainty/doubt they

express about whether the hypothesis is correct or not. Use a scale from 1 ("certain", "no doubt") to 3 ("possible", "quite a lot of doubt").

Hypothesis: Using mobile phones reduces reaction times.

Results supporting the hypothesis

a. These results support the hypothesis that using mobile phones reduces reaction time.2
b. These results confirm the hypothesis that using mobile phones reduces reaction times.1
c. These results seem to support the hypothesis that using mobile phones may reduce reaction times.3

d. These results indicate that using mobile phone may reduce reaction times.2
e. These results show that using mobile phones reduces reaction times.1
f. These results suggest that using mobile phones reduces reaction times.3

Results not supporting the hypothesis

g. These results throw some doubt on the hypothesis that using mobile phones reduces reaction time.3
h. These results contradict the hypothesis that using mobile phones reduces reaction time.1
i. These results do not support the hypothesis that using mobile phones reduces reaction times.2

j. These results show clearly that using mobile phones does not reduce reaction times.1
k. These results indicate that using mobile phones may not reduce reaction times.3
l. These results suggest that using mobile phones does not reduce reaction times.2

Which words and phrases in the sentences helped you to decide on the rankings?

Now look at some of the results from your own study. Which seem to support your initial hypotheses and which do not seem to support them?

Write at least three sentences saying whether or not your findings support your hypotheses/answer your research questions.. Make sure that in each case you express an appropriate level of certainty/doubt.

Task 3: Explaining your results

In the discussion section, you should also try to explain your results. In doing this, you will again be making claims that may need to be softened. Sentences a. to f. explain why one of the findings of the research into mobile phone use was that texting reduces reaction times more than talking on the phone or looking at the screen.

As in task 2, look at the wording of each sentence and decide how much the writers soften their claim, i.e. how much certainty/doubt they express about whether their explanation is correct or not**.** Use a scale from 1 ("certain", "no doubt") to 3 ("possible", "quite a lot of doubt").

Explanation for why texting slows reaction times more than other mobile phone uses

a. This is probably because texting increases visual, cognitive and motor demands.2
b. This is because texting increases visual, cognitive and motor demands.1
c. This could be because texting increases visual, cognitive and motor demands.3

d. It is likely that this is because texting increases visual, cognitive and motor demand.2
e. It is possible that this is because texting increases visual, cognitive and motor demands.3
f. It is clear that this is because texting increases visual, cognitive and motor demands.1

Now look at some of your results and think about how you can explain them. Write at least three sentences using words and phrases from sentences a. to f. above, giving explanations for some of your findings. Make sure that in each case you express an appropriate level of certainty/doubt.

Lesson 12: Preparing the Whole Report

By the end of this lesson, each student ought to be able to produce a more or less complete draft of the whole report, although much editing may still need to be done. In trials of this material, students were then given either one week or two weeks to edit and submit their final drafts. If any student did not submit a final draft by the deadline, this first draft as written in google doc or similar at the end of this lesson was taken as their final submission.

Teachers are encouraged not to correct or themselves re-write any part of the students drafts, although of course as much feedback as necessary should be given to help the students edit their reports themselves. The assessment sheet is designed to give guidance to those students who need to re-submit, and it should be necessary for the teacher to write no or very few comments directly on the students' texts. Teachers may also find it useful to go through the assessment sheet with the students during this final lesson so that can use it as a check list before they submit their final drafts.

Introduction

In this lesson you will write the first draft of your discussion and conclusion sections. You will then put together all the sections that you have drafted to make a complete report. Although you write your own drafts individually, you will as usual be asked to share them with your classmates and get comments from them.

Task 1: Preparing the content of your discussion

Discuss the following questions with your group. Note that you may have already begun to discuss some of these questions in lesson 11.

- What do you think are the most interesting, important or surprising of your results?
- Which results seem to support your initial hypotheses or answer your research questions?
- Which results do not seem to support your initial hypotheses or seem to give unexpected answers to your research questions?
- How certain/doubtful are you about how these results support or do not support your hypotheses / answer your research questions?
- How do your results compare with previous research (especially previous research that you mentioned in your introduction)?
- What explanations can you find for some of your results?
- How confident (certain/doubtful) are you about each of your explanations?

Task 2: Writing the first draft of your discussion

When you are sure you have all the information you need, write the first draft of your discussion section. Don't worry too much about getting the grammar correct or about using exactly the right words. It just needs to intelligible, with all the information logically organized.

After you have written the draft, exchange your draft with those of <u>at least</u> two other class members. When you have received your fellow students' drafts, give them comments on the following:

- Are there are any parts that are difficult to understand?
- Are interesting or important results clearly summarized?
- Are the results related to the initial hypotheses/research questions?
- Are some of the results explained? Do any explanations seem logical and plausible (= believable, likely to be true)?
- Can you suggest anything else that should be added?

Task 3: Writing the second draft of your Discussion

Having read or heard your classmates' comments on your draft, if necessary add extra information, delete information or rearrange information.

Now rewrite your draft, paying particular attention to the following.

- What tenses do you use? Do you use them correctly?
- Does every sentence have at least one finite verb? Does every finite verb have a subject?
- Check your use of countable and uncountable nouns. Do you use singular and plural forms correctly with the countable nouns? Do you use appropriate articles and pronouns?
- Do you use appropriate words and phrases to soften (express doubt about) your claims where necessary?

Again exchange your draft with those of <u>at least</u> two class members. When you have received your fellow students' drafts, read them through noting any places where you think their grammar or vocabulary could be improved, paying particular attention to the features listed above.

When you get your draft back, look at all your classmates' comments on your grammar and vocabulary and make any necessary changes.

Task 4: Preparing the content of your conclusion

In your groups, discuss the following.

- What is the main implication of your research?
- What recommendations can you make based on your research?
- What are the limitations of your research?
- Can you suggest what kind of research on the topic should be done in the future?

Task 5: Writing the first draft of your conclusion

When you are sure you have all the information you need, write the first draft of your conclusion section. Don't worry too much about getting the grammar correct or about using exactly the right words. It just needs to intelligible, with all the information logically organized.

After you have written the draft, exchange your draft with those of at least two other class members. When you have received your fellow students' drafts, give them comments on the following:

- Are there are any parts that are difficult to understand?
- Are the implications of the research clear?
- Are any recommendations given? Do they follow logically from the research results?
- Does anything need to be added?

Task 6: Writing the second draft of your conclusion

Having read or heard your classmates' comments on your draft, if necessary, add extra information or rearrange the information.

Now rewrite your draft, paying particular to grammar and vocabulary. As before, check carefully for mistakes in tenses, sentence structure (subjects and finite verbs), countable and uncountable nouns, and articles.

Exchange your draft with those of at least two class members. When you have received your fellow students' drafts, read them through, noting any places where you think their grammar or vocabulary could be improved.

When you get your draft back, look at your classmates' comments on your grammar and vocabulary and make any changes you think are necessary.

Task 7: Putting it all together

Put together all the sections of your research report that you have drafted and read it through.

- Do all parts of the report fit logically together? Are they in the right order?
- Are there any places where you are still not sure that your grammar or vocabulary is correct? If necessary, you might want to ask a fellow student or your teacher.
- Can the report be improved by adding something? For example, you might want to add more references to previous research or you might want to find a reference to a better definition of a key term in your research. Don't worry if you can't find what you need right now. Just make a note on your draft. You will still have two weeks before you need to submit the report and so you can search for references after class.

Now exchange your report with that of at least one other classmate.

When you receive your classmate's report, make any comments you think are necessary on the language and content.

When you get back your own report, look through your classmates' comments and see if there is anything you do not agree with, or you do not understand. If there is, discuss it with your classmate, and if necessary ask your teacher's opinion.

Task 8: Editing and submitting the final version

You will have time before you need to submit your report to go through it again, adding anything you think should be added, changing anything that you think should be changed and doing a final check of the vocabulary and grammar.

The students can be given one or two weeks to work individually on preparing their final drafts for submission. If possible, the teacher should be available for consultation during this period.

Your teacher will assess your submitted research reports as follows.

1. *Publishable*. This means that your report is good enough to be published by being uploaded to the course website.

2. *Publishable after minor revisions*. This means that your report can be uploaded to the course website after you have made a few changes.

3. *Publishable after major revisions*. This means that you will need to do quite a lot of re-writing before your report can be uploaded.

4. *Rejected*. This means that your report has so many problems that it is not worth taking the time to re-write it. If you have participated in all the tasks during this course, and taken care to edit your report before submitting it, it is very unlikely that your report will be rejected.

Your teacher will show you the assessment sheet that he or she will be using to decide how to assess your report. You can use this sheet yourself as a final check list before you submit your work.

CONGRATULATIONS ON COMPLETING THIS CHALLENGING COURSE

Assessment Sheet for Scientific Reports

Writer's name

Class

Return email

<table>
<tr><td colspan="2">CHECKLIST

If the assessor of your report ticks or writes YES against every comment in this checklist, the overall assessment of your report will be publishable. This means that your report is good enough to be published by being uploaded to the course website. Well done!</td></tr>
<tr><td>Content</td><td>Language</td></tr>
<tr><td colspan="2">Introduction</td></tr>
<tr><td>The research area/topic is introduced and explained with some clear and relevant generalisations or definitions.

At least two references are made to relevant previous research.

In-text citations are used appropriately and all references are listed at the end of the report.

The research questions or hypotheses of the research are clearly stated and follow on logically from the explanation of the research area.

The elements within the Introduction section are logically organized</td><td>Appropriate choices of vocabulary, grammar and formats are made in expressing:

• generalisations and/or definitions

• reporting previous research

• citing and referencing sources

• stating hypotheses and/or research questions.</td></tr>
<tr><td colspan="2">Methods</td></tr>
<tr><td>All necessary information about the context, the participants and tools used (e.g. questionnaires, video clips, mood scales etc.) is included.

The steps in the methods used are clearly stated and the steps are arranged in a logical order.</td><td>Appropriate tense and voice are used consistently in describing the steps.

Pronouns and articles are used appropriately so that it is always clear who or what is being referred to.</td></tr>
<tr><td colspan="2">Results</td></tr>
<tr><td>All relevant results are clearly reported and compared (where relevant).

The elements within this section are logically organized.</td><td>Appropriate vocabulary and tenses are used in reporting results and referring to diagrams/tables.

Appropriate grammatical structures are used for comparing results.</td></tr>
</table>

Discussion and Conclusion	
The readers' attention is drawn to the most interesting/important/ unexpected findings. Some reasonable claims are made about possible reasons for the results, and/or implications of the results, and/or applications of the results. The elements within this section are logically organized	Appropriate hedging language is used to "soften" claims where necessary.
General	
The report has all the necessary sections (Introduction, Methods, Results, Discussion Conclusion) in the right order.	There are no mistakes in vocabulary, grammar or punctuation OR there are a **few** minor mistakes, for example, missing/wrong punctuation mark, missing/ wrong article, minor spelling error; missing "s" on 3rd person sing. verb or plural countable noun, minor spelling mistake. They can all be easily fixed by a proof reader.

OVERALL ASSESSMENT	**Publishable**	**Publishable after minor revisions***
	Rejected*	**Publishable after major revisions***

*Please see notes below to see explanations of these categories.

ADDITIONAL COMMENTS:

Notes

If the assessor of your report has NOT ticked or written **YES** against one or more comments in the checklist, he or she may give one of the following assessments.

- ***publishable after minor revisions***
- ***publishable after major revisions***
- ***rejected***

Publishable After Minor Revisions

This means that you have a small amount of re-writing to do.

Look at which comments do NOT have a tick/ ***yes*** to discover where the problems are.

Any problems with **content** should be quite easy to fix, usually by adding something (e.g. another generalization, another reference to previous research, a missing step in the methods, missing references at the end of the report etc.), by clarifying (making clear) what you have written, by removing something that is not relevant or by reordering some of your points.

There may also be some **language** mistakes (i.e. in grammar or vocabulary). It should be quite easy for you to correct them yourself once you have spotted them. If you are unsure, check in a grammar book or ask your English teacher.

Please make the necessary revisions and resubmit your report for re-assessment.

Publishable After Major Revisions

This means you have to quite a lot to do to make your report publishable.

Look at which comments do NOT have a tick/***yes*** to discover where the problems are.

Some problems with **content** could take quite a lot of work to fix, for example one or more important elements may be missing entirely or need to be greatly expanded. In one or two places it may be hard to follow the logic of what you have written, and so re-writing will be necessary.

There may be quite frequent mistakes in vocabulary, grammar and/or format. It should be possible for you to correct them yourself, but you may need to refer to the relevant lesson notes, to dictionaries and/or to grammar reference books or your English teacher. Occasionally the mistakes may make your text hard to understand, so before you re-submit it would be useful to ask someone to read it and make sure they understand everything.

Please make the necessary revisions and resubmit your report for re-assessment.

Rejected

This means that your report has so many problems that it is not worth spending time trying to revise it. This could be because one or more sections of the report are missing entirely, or that nearly every sentence in the report has a major mistake in grammar or vocabulary, or that it is clear that you did not complete your research project

優質教育基金
Quality Education Fund

香港城市大學
City University of Hong Kong

Genre-based Approach to Enhancing Secondary Students' English Writing Ability in Science Subjects

Students' Handouts

City University of Hong Kong, Department of English
&
Quality Education Fund

QEF project no. 2017/0884

Lesson 1: What is scientific research?

Introduction

Through this course, you will be learning how to write like scientists, which means that you will also be learning something about how to be scientists. You will do some research using scientific methods and afterwards write a report on what you did and what you found. In this first lesson, we will consider what "scientific research" means, by exploring some key words and ideas.

NOTE: At various places in these lessons, you will see a Vocabulary Preparation box. The exercises in each box ask you to match words with their meanings by looking at how the words are used. This should give you some useful practice in working out the meanings of words from context. You may also find that you are more likely to remember words you have learned in this way, than by, for example, simply looking them up in a dictionary.

VOCABULARY PREPARATION

Read through the paragraph below and find the words that are in bold type. Use these words to complete the following sentences.

1. _____ is a verb. When we _____ a thing or an event, we look at it in detail to try find out why it happens, or how it behaves, or what it is like.

2. This is a countable noun. The _____ of something are the ways it behaves (e.g. changes or moves) in particular conditions (e.g. at certain temperatures or under certain pressure levels).

3. This is a countable noun. _____ are groups of stars and planets. One _____may have many billions (1 billion = 1000,000,000) of stars.

Now read the paragraph again and do Task 1

There are many different kinds of scientific research. Researchers may test the chemical **properties** of something by doing experiments in a laboratory, or they may trial a new vaccine by giving the vaccine to one group and something else to another group, or they may **investigate** distant **galaxies** using a radio telescope, or they may carefully observe the behavior of certain animals over a long period, or they may watch the behavior of people in a shopping mall. There is probably nothing that cannot be the subject of scientific research. In this course, we will mainly be researching aspects of human behavior.

Task 1: ***Discussing your experience of scientific research***

In groups, discuss the following questions:

1. What kinds of scientific research have you done in your science lessons?
2. What kinds of scientific research have you read about or heard about?
3. What makes these kinds of research <u>scientific</u>?

.....

Although there are many different kinds of scientific research, they normally all have the following characteristics.

- The purpose of the research is to add to our knowledge in some area of science.
- The researchers take results of previous (earlier) research as their starting point.
- They collect *data* in a *systematic* way. (Don't worry if you are not sure of the meanings of "data" and "systematic". We will come back to them.)
- They *analyse* and *interpret* the data in ways that are logical. (Again, we will come back to the words *analyse* and *interpret* later).
- They report the results of their research (i.e. what they have found out) to other scientists and sometimes members of the public by publishing in scientific journals and giving talks at scientific conferences.

Key words in scientific research

There are five words that express key concepts (ideas) central to scientific research – *hypothesis, data, analysis, interpretation* and *report.*

Key word 1: *Hypothesis*

A *hypothesis* as used in scientific research is a statement that usually has the following characteristics.

- It may be true or may not be true.
- The researchers would like to know if it is true or not.
- It is possible to collect information that can help the researchers to decide whether it is (probably) true or (probably) not true.

NOTE: The word *hypothesis* comes from Greek. Many words in scientific English are formed from words in the Greek and Latin languages, for example, *oxygen, calcium, photosynthesis* and *carbohydrate.* It is worth noting such words when you come across them, as their spellings are often a little odd, and they sometimes have irregular plural forms. The plural of *hypothesis* is ***hypotheses***.

Check the pronunciations of *hypothesis* and *hypotheses*. Practise saying the two forms of the word.

VOCABULARY PREPARATION

Read through Task 2 below. Find the words that are in bold type and use these words to complete the following sentences.

1. _____ is an uncountable noun, although it may be countable in other meanings. The _____ of something is how good or bad it is. The _____ of something may also be described as be high or low.
2. _____ is an adjective from the verb _____. When we _____ a liquid, we heat it until it evaporates and then cool it down again.
3. _____ is an adjective. Someone who is _____ is paying attention and is ready to react to whatever happens. The noun related to _____ is _____.

Now do Task 2

Task 2: Evaluating hypotheses

Which of the following statements would make good scientific hypotheses? If you think any of them could NOT make good hypotheses, be ready to explain why. Can you suggest ways to make them better scientific hypotheses?

In order to answer the above questions think about:

- How useful or interesting would it be to know whether the statement is true or not?
- What kind of information would you need to discover if the statement is true or not?
- How difficult would it be to collect such information?

Possible hypotheses

a. If you add milk to tea, it spoils the taste.
b. Plants grow better if music is played to them.
c. Girls are better than boys at learning languages.
d. Drinking tea or coffee after 12 noon affects the **quality** of sleep at night.
e. Spending more than 5 hours a day looking at a mobile phone is bad for you.
f. K-pop is more popular than local pop music among young people in Hong Kong.
g. Students who stop revising the day before an examination generally do better in the examination than students who revise up until the last moment.
h. K-pop is better than local pop music.
i. Getting at least 8 hours of sleep a night makes people more **alert.**
j. Whether you use **distilled** water or natural spring water to water a plant, it makes no difference to how the plant grows
k. You can learn a foreign language faster by studying it for 15 minutes every day than by studying it for 2 hours on one day every week.
l. It is important that all secondary school students should learn a second language.
m. Research Questions

n. Instead of hypotheses in the forms of statements, scientists also often express what they are going to research in the form of research questions. For example, you can express the hypothesis "Getting at least 8 hours of sleep a night makes people more alert" as a question "Does getting 8 hours of sleep make people more alert?". Research questions are often used when you want to allow for a wider range of possible results, for example "How does duration (= length of time) of sleep affect mental alertness?"

.....

VOCABULARY PREPARATION

Read through Task 3 below and find the words that are in bold type. Use these words to complete the following sentences.

1. _____ is an uncountable noun, although it may be countable in other meanings. It refers to how keen a person is to do something, i.e. how much they want to do it. A person's _____ to do something may be high or low.

2. _____ is an uncountable noun. It is a chemical substance found in coffee, tea and cocoa. It can make us more awake and active.

3. _____ is an uncountable noun. It comes from the verb _____. To _____ air or water means to make them dirty or impure.

4. _____ is a countable noun. If there is a _____ between two or more things they are connected or linked in some way.

5. _____ is here an uncountable noun, but it can also be used as countable noun. It means the opposite of failure. The verb related to _____ is _____.

Now do Task 3

Task 3: Forming hypotheses and research questions

Try to come up with at least one hypothesis for each of the following general research areas.

a. The vitamin C content of different kinds of food
b. The **relationship** between **motivation** and **success** in language learning.
c. The effects of noise on people
d. Air pollution in Hong Kong
e. Light **pollution** in Hong Kong
f. The effects of different kinds of music on people.
g. The effect of **caffeine** on our body.

Write out your six hypotheses and share them with one or two classmates (if possible using Google Docs or a similar text sharing application).

Give your classmates feedback on each of their hypotheses. Use the following questions to guide your feedback.

- Is the hypothesis logical and interesting?
- Is it possible to find information to test the hypothesis?
- If it uses an "if" structure, is the structure used correctly? If necessary, check it by comparing it with hypothesis a in Task 2 above.
- Does it have a VERB+*ing* phrase as its subject? If so, is the structure used correctly? Compare it with d, e and i in Task 2 above.
- Does it contain a comparative structure (eg: *x is bigger than y*)? Is the structure used correctly Compare it with b, c, f, g, I and k in Task 2.
- What tense is used? Is it the correct tense? Compare with any of the hypotheses in Task 2.
- Does every finite verb have a subject and does the verb agree with the subject?

When you have received your classmates' feedback, revise your hypotheses as necessary. Now try re-writing at least two of your hypotheses as research questions.

Key Word 2: *Data*

Data is information that scientists collect in order to help them discover if their hypotheses are true or not, or to discover what the answers to their research questions are. Data should be *systematic*. This means that it must be collected in a careful and efficient way, according to a method that you have planned in advance (a "system"). Things that you have read about, or something a classmate has told you, or something you noticed while walking around – none of these by themselves are data. However, if you walk along exactly the same route every day at exactly the same time and count the number of people, or dogs or cars that you see, this could be data. Or if you ask every student in your form the same question in the same way, and if you can be reasonably sure that they are telling you the truth, then their answers could be data. Of course, it must be a question that gives you answers that will help you test your hypotheses or answer your research questions. The methods you use to collect data are therefore very important, and need to be planned carefully in advance.

NOTE: The word *data* comes from Latin (it means "given"). In Latin, it is a plural noun and so some writers prefer to use it also as a plural noun in English, for example "The data <u>are</u> clear". However, as we hardly ever use the Latin singular form *datum*, many writers use *data* as an uncountable noun, for example "The data <u>is</u> clear". It does not matter whether you use it as a plural noun or an uncountable noun, as long as you are consistent (= always do the same).

Task 4: Collecting data

Take at least two of the hypotheses that you came up with while doing Task 3 above and suggest how you might systematically collect data to test them.

.....

Key Word 3: *Analysis*

Once scientists have collected their data, they need to *analyse* it. When they analyse data, they look very carefully at it in order to find patterns that will help them to understand it or explain it. For example, an analysis (= the noun from analyse) of data may enable scientists to discover ways in which some things are similar and some things are different, so that they can *classify* them, i.e. put them into groups according to their similarities and differences. Analysis may also show how some things change over time. Sometimes the analysis may reveal a *correlation*, i.e. it shows that things are related in some way, because whenever one thing occurs another thing is likely to occur, or whenever one thing changes, another thing is likely to change. Often data will be in the form of numbers, so scientists need to do some kind of arithmetical or mathematical analysis.

NOTE: *Analyse* is a verb. It can also be spelled *analyze*, especially in the US. The noun is *analysis*. Like *hypothesis*, *analysis* comes from a Greek word, and its plural is *analyses*.

Check the pronunciations of *analyse, analysis* and *analyses* and practise saying them.

Key Word 4: *Interpretation*

After scientists have analysed their data, they need to *interpret* the results of their analyses. In other words, they must try to explain the patterns in the data using logical, scientific arguments. They will also normally try to relate the results to the hypotheses or research questions that they started with. It is important not to use personal opinions or guesses. Note that is rare for the *interpretation* (= the noun from *interpret)* to claim that the data proves that a hypothesis is true or not true. In most cases, an interpretation can only give some good reasons for concluding that the results show that a hypothesis is probably true or probably not true.

Key Word 5: *Report*

If scientists do research and find something interesting, they will want to share their findings with other scientists. This is not only to inform other scientists of what they have found but also to give other scientists a chance to check their results, sometimes by repeating the same experiments to see if they get the same results. Therefore when scientists report on their research, they have to be clear about how they collected and analysed the data, and they have to show that their interpretations are logical and based on the data. Note that the word *report* is both a countable noun and a verb, so we can say both "we will report [*verb*] our results" and "we will write a report [*noun*] about our results".

Be sure that you are clear about what is meant by *hypothesis/hypotheses; data, analysis/analyses*, *interpretation* and *report* in the context of scientific research, as we shall be referring to these words and concepts frequently throughout this course.

Lessons 2 & 3: Getting Started

Project Title: The Effects of Music

In this project, your group will be investigating ways in which people are affected by music. You will first be asked to explore the topic by answering some questions. You will then be guided through the steps you should take to do the research.

The tasks in these notes are for lessons 2 and 3. You may also need to do some work by yourself in the time between the two lessons.

VOCABULARY PREPARATION

Read through Task 1 below and find the words that are in bold type. Use these words to complete the following sentences.

1. The noun _____ can be countable or uncountable. In biology we talk about the *sex* of people or animals. In talking about humans, we sometimes use the word _____ instead. For most people, their biological sex is the same as their _____, i.e. male or female.
2. _____ is a countable noun. A _____ is a regular beat. A person's _____ is the regular beating of blood through their body.
3. _____ is an adjective that describes what goes on in people's minds.

Task 1: ***Exploring the topic***

Discuss in your group the following questions and keep a note of the answers that you all agree on. Also note any questions you cannot answer so that you can work on them later.

- What is a person's **pulse?**
- How do we measure a person's pulse rate? Practise taking your group mates' pulse rates.
- What is a person's heart rate?
- What is the relationship between pulse and heart rate?
- What do you think heart rate tell us about someone's **mental** state?
- What effect do you think slow, gentle music might have on someone's mental state?
- What effect do you think fast, loud music might have on someone's mental state?
- Do you think that the effects of music may vary with **gender** or with age or with any other factor?

VOCABULARY PREPARATION

Read through Task 2 below and find the words that are in bold type. Use these words to complete the following sentences.

1. Someone who is you _____ is the same as you in some way or equal to you in some way. For example, he or she may be the same age as you or may do the same work as you. A scientist's _____s are other scientists, usually those working in the same area of science.
2. _____ is an uncountable noun that refers to the processes by which humans and all other living things take food into their bodies and absorb it.
3. _____ is a countable noun. A person's _____ is the food that he or she regularly eats.
4. When a book, an article, a film etc. has been _____, somebody has read it or looked at it and expressed their opinion about it.
5. A person who is _____ is not involved in a particular situation and should therefore be able to give a fair opinion about it.
6. Information that is _____ is likely to be true or correct. A source that is _____ is therefore likely to contain true or correct information.

Task 2: ***Evaluating online sources***

The first step in doing your research is to find out what other scientists have said about your topic and what research has already been done. Much of the information you need will be online, but you must be careful that you take information only from **reliable** sources.

Suppose your research topic is related to **diets** and health. You have googled "heathy diet" and found the following five web addresses.

1. Ad. https://www.noom.com *Diet Meal Plans – Get Healthy Again with Noom*
2. https://www.who.int/news-room/fact-sheets/detail/healthy-diet *Healthy diet -WHO | World Health Organization*
3. https://en.wikipedia.org/wiki/Healthy_diet *Healthy Diet – Wikipedia*
4. https://pubmed.ncbi.nlm.nih.gov/32012681/ *Defining a Healthy Diet: Evidence for The Role of Contemporary Dietary Patterns in Health and Disease*
5. https://www.nutrition.org.uk/healthyliving/healthydiet/healthybalanceddiet.html *A Healthy, Balanced diet – British Nutrition Foundation*

Here are some comments you might make about these web addresses without even reading their content. Which comments could apply to which addresses?

A. This looks like a genuine scientific research paper – worth checking. (No. ___)
B. This is a source I know. Usually, I find their articles very useful in starting to research any subject, but I should not rely entirely on this source, as it is not possible to know who actually writes the articles. (No. ___)
C. I think this is a commercial company. They are probably trying to sell something. I had better not rely on their information. (No. ___)
D. This sounds like it comes from a reliable source, but actually I have never heard of this organisation. Anyone could use this name. I had better check first before using information from them. (No. ___)
E. This is an organisation that is well respected world-wide and any information it provides is likely to be scientifically reliable. (No. ___)

Later, you check two of the sources mentioned above (nos. 4 & 5) and find the following pieces of additional information. Do these additional pieces of information change your evaluation of the reliability of these two sources? Do you think they are more reliable or less reliable than you first thought?

No.4

Here are more details about the paper (article) that this website refers to.

> *Defining a Healthy Diet: Evidence for the Role of Contemporary Dietary Patterns in Health and Disease*, Hellas Cena and Philip C. Calder, in *Nutrients* 2020 Feb, 12(2): 334

And here is what you have found out about *Nutrients.*

> *Nutrients* (ISSN 2072-6643; CODEN: NUTRHU) is a **peer-reviewed**, open access journal of human nutrition published monthly online by MDPI.
>
> MPDI is an online publisher of scholarly articles based in Switzerland.

No. 5

This is what the British Nutrition Foundation say about themselves:

> The British **Nutrition** Foundation is a registered charity.
>
> - We provide **impartial**, evidence-based information, resources and training on food and nutrition. (Find out more here.)
> - BNF's vision is *'Everyone can access healthy, sustainable diets*' and it is contributing towards this through its Mission *'Translating evidence-based nutrition science in engaging and actionable ways'.*
> - We do not lobby, endorse any products, engage in food advertising campaigns or allow commercial or political pressure to influence us when publishing or disseminating information.
> - We are a founding member of The Academy of Nutrition Sciences - a joint initiative between the Association for Nutrition (AFN), the British Dietetic Association (BDA), the British Nutrition Foundation (BNF) and the Nutrition Society (NS) - a collective voice for evidence-based nutrition science.

Task 3*: Searching for information about your own topic*

Working in your group, use some key words relating to your own research project (the Effects of Music) to find some online sources. Which sources look as if they may have reliable information? How do you know?

Beginning with the sources you have found, try to find information to answer the following questions.

- How can some of the key words and concepts relating to your project be defined?
- How do scientists measure and describe pulse rate and heart rate?
- What research has been done about the effects of music on heart rate?
- What did the previous research find?
- What research has been done about relationship between heart rate and mental state?
- What did the previous research find?
- What research has been done about the effects of music on someone's mental state?
- What did the previous research find?

Continue looking for information to answer these questions whenever you have time after the lesson. Use not only online sources but also and any books and other materials you can find. Bring notes on everything you find to lesson 3 and share the information with your group.

NOTE: Whenever you find a piece of relevant information, take note of it and if it is online, copy the URL and the name of the website. If it refers to a scientific article that has been published, take a note of the writer or writers' names, the title of the article, the name of the journal as well as the issue number and date of publication. If you find information in a book, make sure you take a note of the book's title, the writer (or writers), the publisher and the date of publication. Also keep note of the page numbers.

Task 4: *Drafting hypotheses and research questions*

Working with your group, *draft* (see note below) AT LEAST three hypotheses or research questions for your research.

NOTE: You will often need to *draft* text during this course. *Draft* can be used as a verb or a noun. A draft is an early version of the text that you want to write. For example, you might need to write a first, second, third, fourth and perhaps even fifth draft of each section in your research report. This is normal. No scientist – or any other kind of writer – would try to publish the first draft of a text that he or she has written. Luckily, these days we don't have to constantly re-write our texts by hand. Using a word processor makes it a lot easier to draft and redraft. You will also need to sometimes share drafts with your classmates or teacher. Please right from the start, do all your drafting in Word or a similar word processing programme and share your drafts using an application such as Google Docs. Your teacher will guide you in this.

VOCABULARY PREPARATION

Read through Task 5 below and find the words that are in bold type. Use these words to complete the following sentences.

1. A _____ is someone who does something without wanting to be paid or be rewarded for doing it, usually because they feel that it is something worth doing.
2. A _____is someone who takes part in some kind of activity, for example a competition.
3. _____ is transitive verb. When you _____ someone, you persuade them to join a group, a society or an organization.

Task 5: *Preparing to collect data*

You need to start collecting data as soon as possible, so make sure you agree at least by the end of lesson three on the methods you will use.

Below is a suggested procedure (set of steps) for collecting data for your project. You do not have to exactly follow this procedure. You may change it or adapt it to fit your hypotheses/research questions, the time you have to collect data, etc. Discuss the procedure in your group and make any changes you think are necessary.

Suggested procedure:

1. Prepare a list of questions to gather information about:

    a. when people listen to music;
    b. what kinds of music they listen to;
    c. how they feel when they listen to music;
    d. whether they believe that different kinds of music have different effects on them.

2. Prepare a recording of 2 to 3 minutes of fast, rock or pop music, followed by 2 to 3 minutes of slow, gentle classical or "easy listening" music. Make sure there is some space between the two recordings.

3. **Recruit** about 20 **volunteers** (i.e. 4 to 5 for each group member) to take part in your study.

4. For each **participant,** follow these steps.
    a. Interview each participant using the list of questions you have prepared. Either record your interview or keep a detailed record of their answers. Make sure you also keep a record of each person's gender (male or female), age etc.
    b. Before taking the participant's pulse, make sure he or she is calm and has been resting for 5 minutes.
    c. Measure the participant's pulse for 10 seconds, multiply by six, and record the result in 'heartbeats per minute'.
    d. Play some fast rock or pop music and let the participant listen for about 2 minutes
    e. Measure the participant's pulse again.
    f. Allow the participant to calm down and rest for 5 minutes.
    g. Measure the participant's pulse again.
    h. Play some slow, gentle classical or "easy listening" music and let the participant listen for about 2 minutes.
    i. Measure the volunteer's pulse again.
    j. Compare the results of the pulse before and after listening to fast and slow music.

After you have agreed on the final version of the procedure you will use, consider the following questions:

- How many people will each student in your group interview and do the experiments with?
- What do you need to do to prepare the experiments?
- How will you record all the results of your interviews and experiments?
- You will need to finish collecting your data by lesson 9. What is your timetable for collecting all the data?
- Will every student be able to collect data according to this timetable?

Lessons 2 & 3: Getting Started

Project Title: Laughter and Mood

In this project, your group will be investigating the relationship between laughter and mood. You will first be asked to explore the topic by answering some questions. You will then be guided through the steps you should take to start doing the research.

The tasks in these notes are for lessons 2 and 3. You may also need to do some work by yourself in the time between the two lessons.

Task 1: ***Exploring the topic***

Discuss in your group the following questions and keep a note of the answers that you all agree on. Also note any questions you cannot answer so that you can work on them later.

- What do we mean by mood?
- What words can we use to describe different moods?
- How do know what mood a person is in?
- How does laughter affect mood??
- How many times a day do you think people usually laugh?
- Do you think some kinds of people laugh more than other kinds of people?
- What kinds of things are most likely to make people laugh?
- How much laughter do you think is good for us?

Task 2: ***Evaluating online sources***

The first step in doing your research is to find out what other scientists have said about your topic and what research has already been done. Much of the information you need will be online, but you must be careful that you take information only from **reliable** sources.

Suppose your research topic is related to **diets** and health. You have googled "heathy diet" and found the following five web addresses.

1. Ad. https://www.noom.com *Diet Meal Plans – Get Healthy Again with Noom*
2. https://www.who.int/news-room/fact-sheets/detail/healthy-diet *Healthy diet -WHO | World Health Organization*
3. https://en.wikipedia.org/wiki/Healthy_diet *Healthy Diet – Wikipedia*
4. https://pubmed.ncbi.nlm.nih.gov/32012681/ *Defining a Healthy Diet: Evidence for The Role of Contemporary Dietary Patterns in Health and Disease*
5. https://www.nutrition.org.uk/healthyliving/healthydiet/healthybalanceddiet.html *A Healthy, Balanced diet – British Nutrition Foundation*

Here are some comments you might make about these web addresses without even reading their content. Which comments could apply to which addresses?

A. This looks like a genuine scientific research paper – worth checking. (No. ___)
B. This is a source I know. Usually, I find their articles very useful in starting to research any subject, but I should not rely entirely on this source, as it is not possible to know who actually writes the articles. (No. ___)
C. I think this is a commercial company. They are probably trying to sell something. I had better not rely on their information. (No. ___)
D. This sounds like it comes from a reliable source, but actually I have never heard of this organisation. Anyone could use this name. I had better check first before using information from them. (No. ___)
E. This is an organisation that is well respected world-wide and any information it provides is likely to be scientifically reliable. (No. ___)

Later, you check two of the sources mentioned above (nos. 4 & 5) and find the following pieces of additional information. Do these additional pieces of information change your evaluation of the reliability of these two sources? Do you think they are more reliable or less reliable than you first thought?

No.4

Here are more details about the paper (article) that this website refers to.

> *Defining a Healthy Diet: Evidence for the Role of Contemporary Dietary Patterns in Health and Disease*, Hellas Cena and Philip C. Calder, in *Nutrients* 2020 Feb, 12(2): 334

And here is what you have found out about *Nutrients.*

> *Nutrients* (ISSN 2072-6643; CODEN: NUTRHU) is a **peer-reviewed**, open access journal of human nutrition published monthly online by MDPI.
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No. 5

This is what the British Nutrition Foundation say about themselves:

> The British **Nutrition** Foundation is a registered charity.
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> - We provide **impartial**, evidence-based information, resources and training on food and nutrition. (Find out more here.)
> - BNF's vision is *'Everyone can access healthy, sustainable diets*' and it is contributing towards this through its Mission *'Translating evidence-based nutrition science in engaging and actionable ways'.*
> - We do not lobby, endorse any products, engage in food advertising campaigns or allow commercial or political pressure to influence us when publishing or disseminating information.
> - We are a founding member of The Academy of Nutrition Sciences - a joint initiative between the Association for Nutrition (AFN), the British Dietetic Association (BDA), the British Nutrition Foundation (BNF) and the Nutrition Society (NS) - a collective voice for evidence-based nutrition science.

Task 3*: Searching for information about your own topic*

Working in your group, use some key words relating to your own research project (Laughter and Mood) to find some online sources. Which sources look as if they may have reliable information? How do you know?

Beginning with the sources you have found, try to find information to answer the following questions.

- Is there a scientific definition of *mood*?
- What different kinds of mood do scientists identify?
- What scientific research has been done on how laughter affects mood?
- What did the researchers find?
- What research has been done how often people laugh?
- What research has been done on what makes people laugh?
- Are there any recommendations about how much laughter is good for us?

Continue looking for information to answer these questions whenever you have time after the lesson. Use not only online sources but also any books and other materials you can find. Bring notes on everything you find to lesson 3 and share the information with your group.

NOTE: Whenever you find a piece of relevant information, take note of it and if it is online, copy the URL and the name of the website. If it refers to a scientific article that has been published, take a note of the writer or writers' names, the title of the article, the name of the journal as well as the issue number and date of publication. If you find information in a book, make sure you take a note of the books title, the writer (or writers), the publisher and the date of publication. Also keep note of the page numbers.

Task 4: *Drafting hypotheses and research questions*

Working with your group, *draft* (see note below) at least three hypotheses or research questions for your research.

NOTE: You will often need to *draft* text during this course. *Draft* can be used as a verb or a noun. A draft is an early version of the text that you want to write. For example, you might need to write a first, second, third, fourth and perhaps even fifth draft of each section in your research report. This is normal. No scientist – or any other kind of writer – would try to publish the first draft of a text that he or she has written. Luckily, these days we don't have to constantly re-write our texts by hand. Using a word processor makes it a lot easier to draft and redraft. You will also need to sometimes share drafts with your classmates or teacher. Please right from the start, do all your drafting in Word or a similar word processing programme and share your drafts using an application such as Google Docs. Your teacher will guide you in this.

VOCABULARY PREPARATION

Read through Task 5 below and find the words that are in bold type. Use these words to complete the following sentences.

1. A _____ is someone who does something without wanting to be paid or be rewarded for doing it, usually because they feel that it is something worth doing.
2. A _____is someone who takes part in some kind of activity, for example a competition.
3. The _____ of something is how large it is or how long it is.
4. Something that is _____ is good for us.

Task 5*: Preparing to collect data*

You need to start collecting data as soon as possible, so make sure you agree at least by the end of lesson three on the methods you will use.

Below is a suggested procedure (set of steps) for collecting data for your project. You do not have to exactly follow this procedure. You may change it or adapt it to fit your hypotheses/research questions, the time you have to collect data, etc. Discuss the procedure in your group and make any changes you think are necessary.

Suggested procedure:

1. Prepare a list of questions to gather information about:

    a. how often people laugh:
    b. what they believe the effects of laughter to be:
    c. to what **extent** they believe that laughter is **beneficial**.

2. Recruit at least 20 **volunteers** (i.e. 4 to 5 for each group member) to take part in your study.

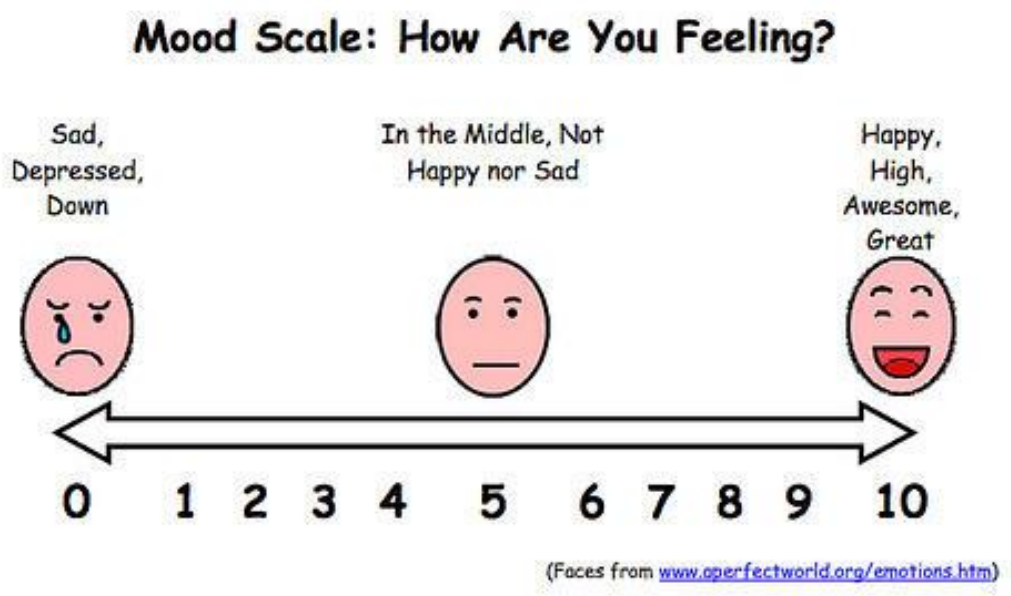
3. Identify 3-5 short funny videos and prepare them for viewing.

4. For each **participant**, follow these steps:

    a. Have the participant rate their mood at the present moment according to a happiness scale. A very simple happiness scale is given below, but you may be able to find a better one or even design your own.
    b. Get the participant to fill out your questionnaire about laughter.
    c. Show each participant your list of funny videos and ask them* to select the video that they* think they will find most funny.
    d. Allow the participant to watch the video, which should make them laugh
    e. Have the participant rate their mood again according to the happiness scale.

    *NOTE: When referring to "each participant" you might expect to see "him or her" and "he or she". However, because this is clumsy, many people nowadays prefer to use "them" and "they", even though "each participant" is singular.

5. Repeat steps 4a. to 4e. with all of the participants.



After you have agreed on the final version of the procedure you will use, consider the following questions:

- How many people will each student in your group interview and do the experiments with?
- What do you need to do to prepare the experiments?
- How will you record all the results of your interviews and experiments?
- You will need to finish collecting your data by lesson 9. What is your timetable for collecting all the data?
- Will every student be able to collect data according to this timetable?

Lessons 2 & 3: Getting Started

Project Title: Multitasking

In this project, your group will be investigating people's ability to multitask. You will first be asked to explore the topic by answering some questions. You will then be guided through the steps you should take to start doing the research.

The tasks in these notes are for lessons 2 and 3. You may also need to do some work by yourself in the time between the two lessons.

VOCABULARY PREPARATION

Read through Task 1 below and find the words that are in bold type. Use these words to complete the following sentences.

1. A _____ is a good result you get from something. It can also be used as a verb. Something that _____ you is good for you.
2. If you are _____ with something, you know it well.
3. A _____ is a possibility that something bad or unpleasant may happen.

Task 1: ***Exploring the topic***

Discuss in your group the following questions and keep a note of the answers that you all agree on. Also note any questions you cannot answer so that you can work on them later.

- What is multitasking?
- Discuss some examples of multitasking that your group is **familiar** with.
- What factors can affect a person's ability to multitask?
- What are the **benefits** of multitasking?
- What are the **risks** of multitasking?
- Do you think that some kinds of people are better at multitasking than others?

VOCABULARY PREPARATION

Read through Task 2 below and find the words that are in bold type. Use these words to complete the following sentences.

7. Someone who is your_____ is the same as you in some way or equal to you in some way. For example, he or she may be the same age as you or may do the same work as you. A scientist's _____s are other scientists, usually those working in the same area of science.
8. _____ is an uncountable noun that refers to the processes by which humans and all other living things take food into their bodies and absorb it.
9. _____ is a countable noun. A person's _____ is the food that he or she regularly eats.
10. When a book, an article, a film etc. has been _____, somebody has read it or looked at it and expressed their opinion about it.
11. A person who is _____ is not involved in a particular situation and should therefore be able to give a fair opinion about it.
12. Information that is _____ is likely to be true or correct. A source that is _____ is therefore likely to contain true or correct information.

Task 2: ***Evaluating online sources***

The first step in doing your research is to find out what other scientists have said about your topic and what research has already been done. Much of the information you need will be online, but you must be careful that you take information only from **reliable** sources.

Suppose your research topic is related to **diets** and health. You have googled "heathy diet" and found the following five web addresses.

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3. https://en.wikipedia.org/wiki/Healthy_diet *Healthy Diet – Wikipedia*
4. https://pubmed.ncbi.nlm.nih.gov/32012681/ *Defining a Healthy Diet: Evidence for The Role of Contemporary Dietary Patterns in Health and Disease*
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Here are some comments you might make about these web addresses without even reading their content. Which comments could apply to which addresses?

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D. This sounds like it comes from a reliable source, but actually I have never heard of this organisation. Anyone could use this name. I had better check first before using information from them. (No. ___)
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Later, you check two of the sources mentioned above (nos. 4 & 5) and find the following pieces of additional information. Do these additional pieces of information change your evaluation of the reliability of these two sources? Do you think they are more reliable or less reliable than you first thought?

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Task 3*: Searching for information about your own topic*

Working in your group, use some key words relating to your own research project to find some online sources. Which sources look as if they may have reliable information? How do you know?

Beginning with the sources you have found, try to find information to answer the following questions.

- How do scientists define and describe multitasking?
- What research has been done on the ways people multitask?
- What did the researchers find?
- What research has been done on the risks and benefits of multitasking?
- What did the researchers find?
- What research has been done to find out what kinds of people are best at multitasking?
- What did the researchers find?

Continue looking for information to answer these questions whenever you have time after the lesson. Use not only online sources but also any books and other materials you can find. Bring notes on everything you find to lesson 3 and share the information with your group.

NOTE: Whenever you find a piece of relevant information, take note of it and if it is online, copy the URL and the name of the website. If it refers to a scientific article that has been published, take a note of the writer or writers' names, the title of the article, the name of the journal as well as the issue number and date of publication. If you find information in a book, make sure you take a note of the book's title, the writer (or writers), the publisher and the date of publication. Also keep note of the page numbers.

Task 4: *Drafting hypotheses and research questions*

Working with your group, *draft* (see note below) AT LEAST three hypotheses or research questions for your research.

NOTE: You will often need to *draft* text during this course. *Draft* can be used as a verb or a noun. A draft is an early version of the text that you want to write. For example, you might need to write a first, second, third, fourth and perhaps even fifth draft of each section in your research report. This is normal. No scientist – or any other kind of writer – would try to publish the first draft of a text that he or she has written. Luckily, these days we don't have to constantly re-write our texts by hand. Using a word processor makes it a lot easier to draft and redraft. You will also need to sometimes share drafts with your classmates or teacher. Please right from the start, do all your drafting in Word or a similar word processing programme and share your drafts using an application such as Google Docs. Your teacher will guide you in this.

VOCABULARY PREPARATION

Read through Task 5 below and find the words that are in bold type. Use these words to complete the following sentences.

1. A _____ is someone who does something without wanting to be paid or be rewarded for doing it, usually because they feel that it is something worth doing.
2. A _____is someone who takes part in some kind of activity, for example a competition.
3. _____ is transitive verb. When you _____ someone, you persuade them to join a group, a society or an organization.

Task 5*: Preparing to collect data*

You need to start collecting data as soon as possible, so make sure you agree at least by the end of lesson three on the methods you will use.

Below is a suggested procedure (set of steps) for collecting data for your project. You do not have to exactly follow this procedure. You may change it or adapt it to fit your hypotheses/research questions, the time you have to collect data, etc. Discuss the procedure in your group and make any changes you think are necessary.

Suggested Procedure:

5. Prepare a list of questions to gather information about:

    - how good people think they are at multitasking;
    - how often people multitask;
    - what they see as the benefits and risks of multitasking;
    - whether they think men or women (boys or girls) are better at multitasking;
    - whether they think younger people (e.g. under 30 y.o.) are better than older people at multitasking.

6. Prepare one or two multitasking games. You can design your own games or find some online games, or you can use the suggestions given below. You should try out the games yourself before using them in your study.

7. **Recruit** about 20 **volunteers** (i.e. 4 to 5 for each group member) to take part in your study. Try to get an equal number of females and males or of young people and older people (depending on your hypotheses).

8. For each **participant,** follow these steps.

    a. Interview the participant using the list of questions you have prepared. Either record your interview or keep a detailed record of their answers. Make sure you also keep a record of each person's gender (male or female), age, etc.
    b. Demonstrate the multitasking games to the participant, showing them* how the games are played.
    c. Have the participant play the games in order to measure their* multi-tasking ability.
    d. Repeat this step twice and record the participant's score on each attempt. Calculate the average score for each participant.

*NOTE: When referring to "each participant" and "the participant" you might expect to see "him or her" and "his or her". However, because this is clumsy, many people nowadays prefer to use "them" and "their", even though "each participant" is singular.

Suggested Multitasking Games

Both these games require participants to process information through the eyes (visually) and through the ears (auditorily).

A: Letters and Numbers

1. Prepare 15 cards, each with one letter and one number (between 1 and 10) written on them.
2. Tell the participants that when you say "letter" and put down a card, they should say whether the letter on the card is a consonant or a vowel. When you say "number" and put down a card they should say whether then number on the card is odd or even.
3. Let the participants try this 5 times, using 5 of the cards. Be careful not to alternate regularly between "letter" and "number" (i.e. don't say "letter, number, letter, number etc." so that the participant knows what is coming next, but say something like "number, number, letter, number, letter" etc.)
4. Do the real test with the remaining 10 cards. Lay down a new card roughly every 3 seconds.
5. Keep a record of the participants' performance.

(See https://www.youtube.com/watch?v=A3WDrZhkOQU for an example of this game)

B: Spoken and Written Stories

1. Write a simple short story (in Chinese, if this is your participants' mother tongue). It should take 20 to 30 seconds to read the story. Write the story on to cards with about 2 sentences on one card.
2. Prepare a different story that takes about the same time to read. Record yourself telling the story.
3. Prepare 5 to 10 questions to test the participants memory of details in the two stories.
4. Put down the cards one by one at a speed that would allow the participants to easily read what is written on them. At the same time, play the recording of the story.
5. Ask the participants the questions and record the number that each participant gets correct.

(See : https://www.youtube.com/watch?v=txWeSnJBT-M for an example of this game)

After you have agreed on the final version of the procedure you will use, consider the following questions:

- How many people will each student in your group interview and do the games with?
- What do you need to do to prepare the games?
- How will you record all the results of your interviews and games?
- You will need to finish collecting your data by lesson 9. What is your timetable for collecting all the data?

Will every student be able to collect data according to this timetable?

Lesson 4: Reporting Research

Introduction

When you have completed your research project, you will need to will write a research report. The report will explain what you were researching, how you did the research, what the results were and what you think the results mean. The purpose of such a report is not only to share your findings, but also to convince readers that your research is valid, in other words to convince them that the research was carried out properly and that your results can be trusted.

In this lesson, we will look at how research reports are usually organized to do these jobs. In other words, we will look at what sections reports usually contain, what the content of each section usually is and in what sequence (order) the sections occur. We will also start to explore the kinds of vocabulary and grammar that can be used in each section.

You should also have enough time after completing the tasks in this lesson to continue discussing your research project with your group mates. By now, you should have drafted your hypotheses/research questions, begun to collect data, found some definitions and other information about your topic as well as information about previous research.

Task 1: Sequencing the sections of a scientific report

Although is no one way to write a report of scientific research, most such reports are likely to contain 5 sections that we can label as follows.

- Methods
- Conclusion
- Discussion
- Introduction
- Results

In the above list, the 5 sections are not in a logical order. In what order do you think these 5 sections are actually likely to occur in a research report?

VOCABULARY PREPARATION

Read through Task 2 below. Find the words that are in bold type and use these words to complete the following sentences.

1. When you _____ something, you give a _____ of it. A _____ is a short, written or spoken version of something. The verb _____ can also be spelled with a "z", especially in US English.
2. _____ is a countable noun. When we talk about the _____s of something, we explain in which ways or contexts it can be used and in which ways or contexts it cannot be used. It is related to the verb _____.
3. _____ is a countable noun. It is a general word for anything that exists or happens. It is formed from a Greek word and the plural form ends in "a".
4. _____ is an adjective. A _____ event or situation is an event that happened before another event or situation.
5. _____ is a countable noun. It refers to how a piece of knowledge or a rule is used in a particular context or for a particular purpose. It is related to the verb _____
6. _____ is an adjective meaning "first", "at the beginning", "where something started".

Task 2: Exploring the content of each section

The paragraphs in the table below describe what content you are likely to find in each section of a research report. Can you match these descriptions with the labels for the 5 sections that you sequenced in Task 1?

Content	Label
This section tells the readers what the researchers found from their analyses of the data that they collected. Often, these findings are set out in tables or in various kinds of diagrams.	
This section identifies and describes the **phenomenon** that was researched. It also usually refers to **previous** research that has been done on the same or a similar topic and makes it clear why more research was needed. It also states the research questions or the hypotheses that the research was designed to test.	
This section tells the reader how the research was carried out. In other words, it explains what kinds of data the researcher(s) collected, where they collected it and how they analysed it.	
This section usually briefly **summarises** the most important findings from the research. It also often suggests how the findings could be made use of, i.e. their possible **applications.** It may also give suggestions for further (more) research.	
This section says what the researchers think the results mean and draws attention to anything that seems important, interesting or surprising. It usually relates the findings to the **initial** hypotheses or research questions. It will also usually attempt to explain the results and to compare the results of the research with results from previous research. It may sometimes also say something about the **limitations** of the research.	

Note: The above description of the contents of each section given above is only a guide. In particular, some of the elements listed in the discussion section may also occur in the conclusion section. In fact, in some reports, discussion and conclusion may be merged into one section.

VOCABULARY PREPARATION

Read through task 3 below and find the words and phrases that are explained in the following sentences. Then do the task.

1. When we are looking at something, we are using our _____ skills.
2. When we are listening to something, we are using our _____ skills.
3. When we are saying something, we are using our _____ skills.
4. If a relationship between two things is _____ _____ (adverb + adjective) , it means that statistical analysis shows that the relationship is due to more than just chance (and therefore can be explained).

Task 3: Identifying the content of different sections

Below are the first paragraph and the last paragraph from a report of research into multitasking, carried out by students in Hong Kong. The first paragraph is the beginning of the introduction section (the introduction as a whole has three paragraphs). It identifies the phenomenon (multitasking) that was researched, defines it and makes a generalization about it. The last paragraph is the whole of the conclusion. It summarises the findings (results) and suggests further research.

Multitasking: A Study of Gender Differences

First Paragraph

The term multitasking refers to doing more than one task at the same time, for example talking on the phone while typing an assignment. Multitasking is common in everyday life, including when we are working, when we are studying, when we are communicating or even when we are just walking around.

.....

Last Paragraph

The findings of this study clearly suggest that there is no **statistically significant** relationship between the multitasking ability of men and women. However, further research could investigate a range of specific tasks that might show a gender difference in certain kinds of multitasking abilities.

Between these two paragraphs, there are 10 other paragraphs, which are given below (out of order). Read through each paragraph and decide which section of the report it belongs to. Note that the introduction section has two additional paragraphs, the methods section has two paragraphs, the results section has three paragraphs and the discussion section also has three paragraphs. After you have decided which paragraphs belong to which sections, put the paragraphs within each section into the most logical order. \

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1. Second, an experiment involving a task that required use of **visual**, **auditory**, and **verbal** skills (Experiment B) was conducted. The participants were asked to complete an online word search on the topic "fruits", while at the same time listening to and answering simple maths questions.

2. Various research studies have identified many factors that can affect a person's ability to multitask. Such factors range from pressure coming from a person's environment, such as a coming deadline (Sarmento & Tsai, 2015), to more personal factors such as habits (Sanbonmatsu, Strayer, Medeiros-Ward, & Watson, 2013).

3. One limitation of our study is that we did not have a lot of information on the personal backgrounds of many of the participants. For example, factors such as whether the participants are frequent game players, or whether their field of study or work assists in their multitasking ability could have influenced their performance.

4. The purpose of our study was to investigate the relationship between gender and the ability to multitask in a sample of Hong Kong participants. Our hypothesis was that there is no statistically significant difference in the multitasking ability between the genders.

5. On average, the males scored slightly higher on average than the females in Experiment A, while the females scored slightly higher on average in Experiment B. However, the differences were not found to be statistically significant

6. First, a visual-visual experiment (Experiment A) was conducted to test the visual-visual multitasking ability of the participants (see Appendix 1). As each level of difficulty increased, additional mini-games were added to the screen to be played at the same time, with two or more games being controlled by each hand. Each participant was asked to play the games three times. All of the final scores in the games were recorded.

7. The increase in the participants' performance in Experiment A as more tries were completed seems to indicate that with more practice, the multitasking ability of an individual can improve, regardless of gender. Other research similarly suggests that multitasking ability can be improved though training (Dux, Tombu, Harrison, Rogers, Tong, & Marois, 2009).

8. In Experiment B (visual-auditory-verbal tasks), the average scores for males and females were 22.35 and 23.47 respectively. The scores of males ranged from 16 to 28 while the scores of females ranged from 16 to 29, as shown in Figure Two.

9. In Experiment A (visual-visual tasks), the average scores for males and females were 53.3 and 51.4 respectively. The scores of males ranged from 22.7 to 90.3 while the scores for females ranged from 22 to 91.3, as shown in Figure One. Figure One also shows that scores for both males and females increased as more tries were completed.

10. The findings support our initial hypothesis that there is no statistically significant relationship between the multitasking ability of men and women. It challenges the findings of previous research which suggested that women are better at multitasking than men (Stoet, O'Connor, Conner, & Laws, 2013; Kuptsova, Ivanova, Petrushevskiy, Fedina, & Zhavoronkova, 2016) and confirms research that found no statistically significant difference between the performance of the two genders (Buser & Peter, 2012).

Now read through the whole report again with the paragraphs in the correct order. Some important information is missing. Can you see what it is? Hint: the missing information should be in the methods section.

Task 4: Using words and phrases often used in research reports

In the second column of the table below you will see a list of verbs that often occur in research reports. Note that the verbs are in different tenses and voices (active or passive). Write complete sentences with these verbs by matching them with appropriate subjects, objects (including *that*-clauses) and adjuncts* listed in the other columns. Note that every verb must have a subject, but not every verb needs an object or adjunct. Be careful that you don't match plural subjects with singular verbs, or singular subjects with plural verbs.

*Adjuncts are words and phrases in a sentence which are additional to the subject, the verb and any objects. Adjuncts often add information about the when, where and how of the situation expressed by the sentence. For example:

We collected the data very carefully.
We collected the data from three kinds of experiment.
We collected the data on three different days.

SUBJECTS	**VERBS**	**OBJECTS**	**ADJUNCTS**
We ... (can be used more than once) *The average scores of the participants* *Arachnophobia* *Our findings* *All the interviews* *Figure 5* *Previous research* *Three experiments* *Further research* *This result*	*has shown* *can be defined* *interviewed* *were recorded* *were conducted* *analysed* *shows* *are set out* *suggests* *support* *recommend* *could investigate*	*a total of 20 participants* *our initial hypothesis that slow, gentle music can have a calming effect on a person's mood* *that recycling stations should be set up in every public housing estate* *the scores for the participants according to age group* *that chocolate can trigger migraine attacks* *the multitasking abilities of people across a wider range of ages* *that music can affect a person's mood* *the results*	*in Table 2 below* *as the intense fear of spiders* *very carefully* *using a smart phone voice recorder application*

Now read through all your sentences. Which are most likely to occur in introduction sections of research reports, which in methods sections, which in results sections, which in discussion sections and which in conclusion section?

Lesson 5: Exploring Introductions

As we saw in the last lesson, the introduction section of a research report is the part in which you explain to other scientists what it was that you researched and what you hoped to find out. In this lesson, we will look at how the introduction sections of two research reports are organized, and what grammar they use.

If you have time after finishing all the tasks in this lesson, start to plan what you will write in the introduction of your own report.

VOCABULARY PREPARATION

Read through Task 1 below. Find the words that are in bold type and use these words to complete the following sentences.

1. _____ is an adjective that describes something that is too large, too extreme or that there is too much of.
2. _____ is an adjective. It refers to a description of something that is more precise and more limited than a general description.
3. _____ is a verb. When we _____ something, we calculate it roughly, based on whatever evidence we have.
4. Our _____ of something refers to our awareness of it, through any of our senses. It can also mean how we think about something or what our opinion of it is.
5. The noun _____ is related to the verb _____, which means to get rid of something that we no longer want or need. Note that both the verb and the noun are normally followed by *of*.

Task 1: Exploring the content of an introduction

Text 1 (below) is the introduction section of a research report written by some university students. Read the text through and find where in the text the following elements occur.

- The research questions (RQ)
- A statement of the general phenomenon that that the research was concerned with (GP)
- The **specific** issues that the students investigated (SI)
- Previous research on the phenomenon (PR)
- Specific details about the phenomenon (DP)

Text 1

A Study of Rubbish Disposal at a Hong Kong University

Introduction

In Hong Kong, **disposal** of rubbish is a major issue. According to statistics from the Hong Kong Environmental Protection Department (2019), the average daily quantity of solid rubbish in 2017 amounted to more than 15,000 tonnes. **Excessive** production of rubbish is leading to the filling up of all Hong Kong's landfill sites. Robson (2017) **estimates** that Hong Kong's landfill sites will become full by 2020 and will no longer be able to accept additional rubbish.

Previous research has focused mainly on collecting data on how much rubbish is produced by different sectors in Hong Kong. Our research focuses on the rubbish disposal problem at one institution, the City University of Hong Kong, and explores the **perceptions** that students at the university have of the problem. We address the following questions.

1. How is rubbish disposal managed at the university?
2. What problems are there with managing rubbish disposal at the university?
3. What are the students' perceptions of the problems?
4. What suggestions do the students have on how to solve the problems?

<u>Questions to think about</u>

1. Is the order of elements in this text logical?
2. Do you think that any element in this introduction should be expanded (made longer)?

Task 2: Exploring the grammar of an introduction

Tense

Five different tenses are used in the first two paragraphs of Text 1. They are simple present, present continuous, simple past, present perfect and simple future. Please read through the examples below, identify the tenses used in them and match each one with the best description of why the tense is used.

Tenses	**Use**
1. In Hong Kong, disposal of rubbish is a major issue. 2. ... the average daily quantity of solid rubbish in 2017 amounted to more than 15,000 tonnes 3. Excessive production of rubbish is leading to the filling up of all Hong Kong's landfill sites. 4. ... and will no longer be able to accept additional rubbish. 5. Previous research has focused mainly on collecting data on how much rubbish is produced by different sectors in Hong Kong	..... tense is used here because the sentence tells us what is happening now (and has not yet finished). ..... tense is used here because the sentence tells what the situation was at a specific time in the past. ..... tense is used here because this sentence predicts a future situation. ..... tense is used here because the sentence tells us what the situation is now. ..... tense is used here because it is looking back at what some people did some time before now, but it does not tell us exactly when they did it.

Some of the uses of simple present tense in the above introduction are more difficult to explain. For example:

- Robson (2017) estimates that Hong Kong's landfill sites will become full by 2020 ...
- Our research focuses on the rubbish disposal problem at one institution, the City University of Hong Kong, and explores the perceptions that students at the university have of the problem.

The first of the above examples tells us what Robson said (or in fact published) in the past (the year 2017), so the past tense verb "estimated" could have been used instead of "estimates", and "would" could have been used instead of "will". Why do you think the writers used present tense here? Which do you think is better in this context, present tense or past tense?

The second of the above examples is talking about research which the writers have already done. So the past tense verbs "focused" and "explored" could have been used. Why do you think the writers used present tense here? Which do you think is better in this context, present tense or past tense?

Nominalisation

In the two following two sentences from paragraph 1, the nouns *disposal, production* and *filling up* all represent kinds of doing or happening – people dispose of rubbish, they produce too much rubbish and the landfill sites are filling up.

1. In Hong Kong, disposal of rubbish is a major issue.
2. Excessive production of rubbish is leading to the filling up of all Hong Kong's landfill sites.

The use of these nouns may seem a bit strange at first, because usually we use nouns to talk about people and things (like chairs, trees, mountains, children etc.), but we use verbs to talk about what people do (dispose of, produce, laugh, investigate etc.) and about what happens (fill up, fall, break, evaporate etc.).

Disposal, *production* and *filling up* are formed from the verbs *dispose, produce* and *fill up.* We can also form nouns from adjectives, as in the following example in which *happiness* is a noun formed from the adjective *happy.*

3. Happiness is very hard to define and measure.

Forming nouns from verbs and adjectives in this way is called *nominalisation* (uncountable). The resulting nouns can themselves also be called *nominalisations* (countable). Nominalisation is common in scientific writing. The word *nominalisation* is of course itself a nominalisation of the verb *nominalise,* which means to turn into a noun. Note that in US English, it may be spelled nominalization.

As can be seen in examples 1 to 3 above, nominalisations can be used as subjects and as objects, just like any other noun. This can be very useful when we need to represent kinds of doings or happenings or qualities as subjects or objects of clauses. Verbs and adjectives cannot, of course, normally be used as subjects or objects.

In everyday speech we tend to use fewer nominalisations. For example, the content of the above three written sentences might be expressed in speech as something like the following examples, in which verbs and adjectives are used instead of nominalisations.

1a. In Hong Kong we dispose of so much rubbish every day. It's a major issue.

2a. Because we produce far too much rubbish, all Hong Kong's landfill sites are filling up.

3a. It is very hard to define what we mean when we say someone is happy and it is very hard to measure how happy they are.

Note that the spoken versions tend to be longer and more complex. No. 1 is one sentence while 1a is two sentences. No. 2 is a simple sentence consisting of one clause, while 2a is a complex sentence with two clauses. No. 3 is also a simple sentence with one clause, whereas 3a is a complex sentence with six clauses.

When speaking, it usually doesn't matter much if we use lots of clauses to say what we want to say. In fact, if we pack what we want to say into a smaller "grammatical space" by using a lot of nominalisations, it can make our speech seem rather dense and sometimes hard to understand. People may feel that we are "talking like a book".

However, in writing, particularly scientific writing, nominalisations are commonly used to make the writing more concise. Nominalisations are particularly useful in science for summing up and labelling complex processes, such as *distillation* (from the verb *distill*) and *evaporation* (from the verb *evaporate*). We can then use these nominalisations as subjects of clauses and sentences to say more about these processes.

Using nominalisations also helps us to classify processes more easily. For example, rain, rivers or the sea can *erode* rock and soil by wearing them away until they are destroyed. Example no. 4 below uses the nominalisation *erosion* to introduce some of the different ways in which rock and soil are eroded and the results these processes have. Think how much more difficult it would be to talk about this using only the verb *erode* instead of the noun *erosion.*

> 4. There are a number of types of erosion that can be observed in our region. These include water erosion, wind erosion, tunnel erosion and stream bank erosion.

Although nominalisations are useful, you need to be careful when you use them.

Firstly, there are many different suffixes used to form nouns from verbs and adjectives, such as *-ion* (e.g. *discussion*), *-ment* (e.g. *agreement*), *-ity* (e.g. *possibility*) and *-ness* (e.g. *sadness*) and you need to check which suffix is used with which verb or adjective. However, as we have seen, sometimes the form does not need to change at all (e.g. the words *increase, rise* and *change* can be both verbs and nouns). Nouns can also be formed by adding *-ing* to any verb (e.g. *filling up*, see no. 2 above). However, sometimes there is no noun that can be formed from a particular adjective, so we have to use a noun related only by meaning, for example:

> 4a. The train was travelling <u>fast</u>. This may have caused the accident.
> 4b. The <u>high speed</u> of the train may have caused the accident. (It would be very unusual to say *fastness*)

Secondly, it is not enough just to be able to form nouns from verbs and adjectives. A nominalisation may be the head of a noun group* which needs to contain lots of other information. In English, unlike in Chinese, information is often put into a noun group after the noun as well as in front of the noun, so in order to write good scientific English you will need to make sure you can use the structures that let you do this. For example:

> 1. <u>Careful investigation of all the data</u> shows that...
> In this example, *investigation* (from the verb *investigate*) is the head of the noun group. It is followed by a prepositional phrase beginning with *of*. Such *of*-phrases are very commonly used in noun groups and often correspond to what would be the object in a clause without the nominalisation, e.g. *We carefully investigated <u>all the data</u>.*)

2. The sharp increase in the scores was unexpected.
In this example, the head (*increase*) is followed by a prepositional phrase beginning with *in.* Here *the scores* would be the subject in a clause without nominalisation, e.g. *The scores increased sharply.*)

3. Recent awareness that the problem is getting worse has led to ...,
In this example, the head *awareness* (from the adjective *aware*) is followed by a *that*-clause that contains a finite verb (*is getting*).

4. The sharp increase in the scores that we observed was unexpected.
In this example, there is both a prepositional phrase and a *that*-clause after the head.

Note that in all these examples, the verbs are singular (*shows, has led, was*) because the heads of the noun groups are either uncountable (*investigation, awareness)* or singular (*increase*).

* A *noun group* consists of a main noun (the *head*) and everything that goes with it. For example, in the noun group *the large increase in temperature that we observed (was unexpected)* the head noun *increase* has an article and an adjective in front of it , and a prepositional phrase and a *that*-clause after it. Note that some grammar books use the term *noun phrase* instead of noun group

Try changing the following sentences into a more informal, spoken style by removing the underlined nominalisations. Note that sometimes you will need to add a subject that is not present in the original sentence. The first one has already been done.

1. There has recently been much public discussion of this issue.
   Answer: The public has discussed this issue a lot recently. OR Recently many people have discussed this issue in public.

2. The building of so many factories in the area has greatly affected air quality.
   (Hint: Begin with *Because...* and either add a subject or use passive voice*)*

3. Practice can improve our ability to multitask.
   (Hint: Use *the more ... the more* and add a subject)

4. An increase in the speed of an object will lead to an increase in its mass.
   (Hint: Begin with *If* or *When*)

5. Multitasking using leads to a fall in efficiency.
   (Hint: Begin with *When* and add a subject. Use the adjective *efficient*)

Now try re-writing the following sentences in a more written, scientific style by nominalising the underlined verbs. The first one has been done.

1. The population started to grow rapidly in the 1970's. This surprised the government.
   Answer The rapid growth in the population in the 1970's surprised the government. (Note the change of the adverb *rapidly* into the adjective *rapid*)

2. When we changed the nature of the task, the average scores increased.
   (Hint: The nouns *change* and *increase* are usually followed by the preposition *in*. Verbs that can express cause and effect between nouns include *result in, cause* and *lead to.*)

3. If we laugh frequently our health improves.
   (Hint: You can use the *-ing* form *laughing* or the noun *laughter.* The noun from *improve* is *improvement*)

4. We measured the air quality in the four urban areas. It was almost the same. (Hint: Use the nominalisation *measurement*)

5. The people living in Area B are relatively poor. This may be why their levels of education are lower.
   (Hint: Use the nominalisation *poverty*)

6. We occasionally observed the particles move slightly. This may have been because the air pressure fell.
   (Hint: Use the nominalisations *movement* and *fall.*)

7. If we can reduce the amount of plastic that we throw away, we will do less damage to the environment.
   (Hint: The nominalisation from reduce is *reduction. Damage* is both a verb and a noun, so you do not need to change its form.)

8. When we analysed the results we found that the average scores of males and females were more or less the same.
   (Hint: the noun from *analyse* is *analysis*. You will find it easier to use the noun *(no) difference* than trying to nominalise *same*.)

VOCABULARY PREPARATION

Read through Task 2 below and find the words and phrases that are explained in the following sentences. Then do the task.

1. _____ are people who are walking, not travelling in a car or in a bus etc.
2. An _____ is a program (software) designed to be used on a mobile device such as a smart phone or a tablet. When we talk about an _____, we usually pronounce just the first three letters of the word.
3. _____ is an adjective which means related to thinking.
4. When we react or respond _____ (adverb) to an event, we react or respond in a correct, suitable or acceptable way.
5. If someone is _____, they are in danger. There is a possibility that something bad will happen to them.
6. The _____ of something is how big an effect it has.
7. _____ is formed from the verb _____. When something _____ someone, it takes away their attention from what they were doing.

Task 3: Comparing the content of two introductions

Read through Text 2 below and discuss the following questions.

1. Is there any element in this text that does not occur in Text 1?
2. In Text 1, the aims of the research are expressed as direct questions. How are they expressed in Text 2?
3. Which element in Text 2 is much longer than in Text 1?
4. Overall, do you think Text 2 is a better introduction than Text 1. Why/why not?

Text 2

Texting can wait!

Introduction

As technology has improved, mobile phones have become a very important part of the lives of many Hong Kong people. They use mobile phones to connect with each other by texting, calling and using various **applications**. However, although mobile phones are very useful, when people use them, they may react to unexpected events more slowly. This can lead to dangerous situations.

According to Reed & Robbins (2008), texting increases a person's visual and cognitive load. Having a conversation on a mobile phone may also increase **cognitive** load and can narrow the user's visual scan (Richtel, 2010). Therefore, while using mobile phones, users may be less able to respond quickly and **appropriately** to sudden events.

Several studies have shown that using smartphones when driving can increase the chance of having an incident. A report by the Government of China stated that in 2014, 47.2% of road incidents in China were related to people using mobile phones when driving. Pedestrians using mobile phones can also be at risk. Jehle (2015) found that users were unable to control complex actions such as walking when they were texting on a mobile phone. Other research has also found that pedestrians using mobile phones have lower awareness and **distracted** attention (Hatfield and Murphy, 2007, Hyman et al., 2010). A statistical analysis conducted at Ohio State University (Richtel, 2010) found that from 2006 to 2008 four times more pedestrians visited a hospital emergency room due to phone-related accidents than due to other factors. Recent research done by Richards (2018) suggests that messaging on a mobile phone may be more distracting than talking on the phone.

Although many studies such as those cited above have been done on the effects of using mobile phones while driving or walking, little information is available on the effect of using a mobile phone on the reaction time of the user in general. Therefore, research in this area is needed.

The purpose of our research is to explore and analyze the impact of mobile phones on user reaction time and to discover whether texting or calling has the greater **impact** on reaction time. Our hypothesis is that texting will have the greater impact.

Task 4: Comparing grammar in the two introductions

Tense

A. Text 1 starts off using the simple present. In Text 2 , however, the first sentence uses present perfect. Why is this? If simple present were used instead, how would the meaning change? Would it be better to use simple present?

B. Look at the ways previous research is referred to in paragraph three. As in Text 1, present perfect tense is used with verbs that report general conclusions based on a number of previous research studies.

1. Several studies have shown that using smartphones when driving can increase the chance of having an incident.

2. Other research has also found that pedestrians using mobile phones have lower awareness and distracted attention (Hatfield and Murphy, 2007, Hyman et al., 2010). (paragraph 3)

Other references to previous research use either simple present tense or simple past tense.

3. Jehle (2015) found that users were unable to control complex actions such as walking when they were texting on a mobile phone. (paragraph 3)

4. A statistical analysis conducted at Ohio State University (Richtel, 2010) found that from 2006 to 2008 four times more pedestrians visited a hospital emergency room due to phone-related accidents than due to other factors. (Line 18)

5. Recent research done by Richards (2018) suggests that messaging on a mobile phone may be more distracting than talking on the phone.

Can you suggest why the writers chose to use simple past in the first of two sentences above but simple present in the third sentence?

Nominalisation

Like Text 1, Text 2 contains nominalisation (OR many nominalisations). We saw earlier that nouns formed by nominalisation are often followed by prepositional phrases and that these phrases commonly use the preposition *of* followed by what would be the object of the verb if the noun group were 'de-nominalised'. For example:

Careful investigation of all the data...

When we carefully investigated all the data.

However, in Text 2 there are some nominalisations in which the structure is a bit different. For example:

Having a conversation on a mobile phone ... (paragraph 2)

... using smartphones when driving ... (paragraph 3)

In these example, verb+*ing* forms are followed directly by an object, not by an *of* prepositional phrase. We can do this because the Verb+*ing* form is still a bit like a verb in that it can have an object.

Rewrite the following sentences changing the underlined verbs into verb+*ing* forms with objects. The first one has already been done.

1. When we mix strong acid with water, a large amount of heat is released.
   Answer: Mixing strong acid and water releases a large amount of heat.
2. We played fast pop music to the participants. This caused their pulse rates to increase.
3. When they tried to do all three tasks at the same time, many of the participants were confused.
4. If people use mobile phones while walking, is it really dangerous?
5. They had to listen to one story and read another story at the same time. This was the most challenging task.
6. We divided the participants into five groups. This enabled us to test five different procedures.

Lesson 6: Drafting your introduction

Introduction

In this lesson we will look first at how you can refer to other people in your report. You will then be guided to write the first draft of your introduction. Although you will write your drafts individually, each of you will asked to share your draft with your classmates and get comments from them.

Task 1: Referring to the work of others

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When writing your report, it is important to tell the reader the source of any information you have got from other publications. We normally do this by mentioning in our text the surname(s) of the writer(s) and the date of publication of each of the articles or books that we got the information from. We then have to list full details of all these sources in a reference section at the end of the report.

Look at the following examples from Text 2 (Lesson 5). What are the different ways in which the authors' surnames and dates of publication are included in the text?

> According to Reed & Robbins (2008), texting increases a person's visual and cognitive load.
>
> Having a conversation on a mobile phone may also increase cognitive load and can narrow the user's visual scan (Richtel, 2010).
>
> Jehle (2014) found that users were unable to control complex actions such as walking when they were texting on a mobile phone.
>
> A statistical analysis conducted at Ohio State University (Richtel, 2010) found that from 2006 to 2008 four times more pedestrians visited a hospital emergency room due to phone-related accidents than due to other factors.
>
> Other research has also found that pedestrians using mobile phones have lower awareness and distracted attention (Hatfield and Murphy, 2007, Hyman et al., 2010).

Which of the above forms would it be best to use if use if you are not certain that the information you are reporting is correct?

Now look at the full references as they appear in the reference section at the end of the report from which this introduction is taken

- What is added to the surnames of the authors?
- Which parts of the references are the names of the articles and which parts are the names of the journals or newspaper in which the articles were published?

One reference is to an online source. Note how the online source is given using the URL (web address).

In fact, this reference to an online source is inaccurate. Check it for yourself. What is wrong with the way Jehle's comments are reported and referenced in Text 2?

References

Hatfield, J., & Murphy, S. (2007). The effects of mobile phone use on pedestrian crossing behaviour at signalised and unsignalised intersections. *Accident Analysis and Prevention, 39*, 197–205.

Hyman, I.E., Boss, S.M., Wise, B.M., Mckenzie, K.E., & Caggiano, J.M. (2010). Did you see the unicycling clown? Inattentional blindness while walking and talking on a cell phone. *Applied Cognitive Psychology, 24*(5 , 597-607.

Jehle, D. V. (2014). Think it's safe to type a quick text while walking? Guess again. *UBNow.* Retrieved from http://www.buffalo.edu/ubnow/stories/2014/February/texting_walking.html.

Reed, N. & Robbins, R. (2008). The effect of text messaging on driver behavior: a simulator study. *Accident Analysis and Prevention, 50*, 122-129.

Richtel, M. (2010, January 16). Driven to distraction: Forget gum. Walking and using phone is risky. *The New York Times*, p. A1.

Task 2: Writing the first draft of your introduction

A. Preparation

Before beginning to write your individual drafts, discuss with your group the following questions.

1. How are you going to introduce the phenomenon that is the topic of your research?
    - Are you going to define it?
    - Are you going to make some generalisations about it?
2. Do you need to narrow down the general phenomenon to a more specific phenomenon or issue?
3. Are you going to say anything about why it is important, necessary or useful to do research on this phenomenon?
4. What have you found about previous research done on this phenomenon? Do you need to find more information on this?
5. What are your hypotheses or research questions?

B. Writing

Now write your first draft. If possible type it into google docs or a similar application so that you can easily share it with your group mates and with your teacher.

Don't worry about getting every word correct, but try to make sure you include all necessary content in a logical order. If there is information that you still need to find (for example references to previous research) just indicate in your draft where you will put the information when you have found it.

C. Commenting and checking

The members of each group should now read through the drafts of all their fellow group members. Consider the following questions and give one another feedback.

1. Are there any elements missing?
2. Are there any elements that need expanding?
3. Does every sentence have at least one finite clause?
4. Does every finite verb have a subject?
5. Are appropriate tenses used?
6. Is nominalisation used correctly and appropriately?
7. Is all the information that has been taken from somewhere else properly referenced?

D. Editing your draft

When you have received your group mates' comments, make any changes to your own draft that you think are necessary. Don't worry if it is still not complete or "perfect". You will have time to work more on it before you need to submit it.

Lesson 7: Explaining how the research was carried out

Introduction

The methods (sometimes called 'methodology') section of a scientific report explains how you did your research. In other words, it tells readers how you got the data that you used to try to answer your research questions or test your hypotheses. It also usually explains how you analysed the data.

A methods section should include enough information about how you carried out your research so that readers can feel sure that the results you report are likely to be valid. Valid results are results that are reliable because they are based on good evidence and good reasons. This section should also explain what you did clearly enough so that other researchers can use the same methods themselves to research the same or a similar phenomenon.

In this lesson you will first examine a methods sections from a research report written by university students. In the second task you will be asked to write a methods section yourself based upon a set of instructions.

VOCABULARY PREPARATION

Read through Task 1 below. Find the words that are in bold type and use these words to complete the following sentences.

1. _____ is an adjective. If you are _____ of something you know about it.
2. When you _____ something, you keep a _____ (same spelling but a different syllable is stressed) of it in order to remember it. This _____ may be in the form of writing, or it may be audio (sound) or video.
3. When you do something ___ _____, you do it without a definite plan or you do it without following a specific pattern.
4. The _____ of something is the place where it has been put, or where it can be found.
5. The _____ of something is the largest amount that it can contain.

Task 1: Sequencing sentences from a methods section

TEXT ONE

Methods

a. In order to find out how **aware** students are of the waste problem at the university, 10 students chosen **at random** were interviewed.
b. The bins were checked from time to time and the total volume of rubbish inside them was measured and **recorded**.
c. Bin 1 was at the entrance to the canteen, bin 2 was near the lift on the ground floor and bin 3 was near the exit to the university concourse.
d. Each of the students was asked to answer questions and the interviews were audio-recorded for the later analysis.
e. The **capacity** of each bin was recorded using a tape measure.
f. In order to estimate the amount of rubbish produced every day by students at the university, three bins at different **locations** within one academic building (AC1) were selected.

The most logical order for the above sentences is:

1.
2.
3.
4.
5.
6.

1. Text one below is a list of six sentences that come from the methods section of a research report on rubbish disposal at a Hong Kong university. The sentences are out of order. Arrange them according to what seems to be the most logical order.
2. The original text had two paragraphs. Where could the paragraph break be?
3. Find the sentence in which the writers use the verb *estimate*. How would the meaning be different if the writers had used the verbs *find* or *discover* instead of *estimate*?
4. All the verbs in this section are in past tense except in one sentence. Which sentence? Why are the verbs in this sentence not in past tense? Would it be possible to use past tense? What difference would it make?
5. All the clauses in the text that describe what the researchers did, are passive voice

clauses using passive voice verb forms. For example:

1. *Three bins at different locations within one academic building (AC1) were selected.*
2. *The capacity of each bin was recorded using a tape measure.*
3. *10 students chosen at random were interviewed.*
4. *Each of the students was asked to answer questions.*

Try changing these passive voice clauses into active voice clauses. More than one researcher was involved in this research, so the subject of the active voice clauses will be "we". Make sure that although you change the voice of these clauses, the tense will still be simple past.

1. *We ....*
2. *We ...*
3. *We ...*
4. *We*

In order to check for yourself that you are clear about the differences between the forms of active and passive voice sentences, cover up the four **passive** clauses from the text above, and rewrite the **active** voice clauses that you just wrote as passive voice clauses. Compare your passive voice sentences with the original sentences.

Use of active and passive voice

In the past, students learning to write scientific English were usually advised to use passive voice in writing the methods sections of research reports. However, these days scientists often also use active voice when describing their methods. If you use active voice, the text seems a little more personal and a little less formal. Of course, whether you use active voice or passive voice, your verbs should be in past tense, because when you write your final report you will have already finished the research.

Sometimes, writers may mix the two voices, for example:

> *We selected 20 secondary school students to take part in our study* [ACTIVE]. *The students were first given a questionnaire to fill out [PASSIVE]. They were then asked to do task one [PASSIVE].*

This switching from active to passive works well. Using active voice in the first sentence makes it clear who the researchers were – the authors of the report - and introduces the information about the student participants. After that there is no need to mention the researchers and the following sentences in passive voice are all about the students, so they can be the subjects of each sentence. However, switching between active and passive voice needs to be done with care. If you are in any doubt, it is best to choose either active voice or passive voice to write your methods section, and to keep the same voice all the way through.

.....

VOCABULARY PREPARATION

Read through Task 2 below. Find the words that are in bold type and use these words to complete the following sentences.

1. The noun **_____** is related to the verb _____. When you **_____** on something, you pay full attention to it without thinking about anything else.
2. The noun _____ is related to the adjective **_____**. Something that is _____ is true or correct.
3. The _____ of research are the people who are researched, i.e. the people who you get data from by interviewing them or asking them to do things. Often scientists prefer to use the word *participants* instead of _____, as this makes it clearer that the people are taking part in the research themselves rather than just been observed or experimented on.

TEXT TWO

Chewing Gum and Concentration

1. Find 8 male **subjects** of roughly the same age and divide them into two groups.
2. Ask the 4 members of the first group to play the memory game at https://www.webgamesonline.com/memory/index.php 5 times.
3. Record how long it takes each subject to complete each game.
4. Give the 4 members of the second group some chewing gum and ask them to play the same memory game 5 times while chewing the gum.
5. Record how long it takes members of this group to complete each game.
6. Analyse the results. Did chewing gum increase the subjects' speed and **accuracy** in the memory game?
7. Now repeat the procedure with 8 female subjects of roughly the same age.
8. Analyse the results. Did the gender of the subjects make any difference to their speed and accuracy in the game?

1. Text Two is a set of instructions for doing research into the effect of chewing gum on **concentration.** Imagine that you have done this research and are now writing a research report about it. Use the instructions below as the basis for writing the methods section of your report. Write the methods using the personal, less formal style.

You can number each step as is done in the instructions or you can write this section as one or two paragraphs. If you write it as paragraphs, you may need to add some sequencers, such as *first, then* and *after that.* Also note that you will need to find a way to change the questions in steps 6 & 8 into indirect questions and to include them in the sentences describing these steps. If you have difficulty doing this, look back at the text in Task 1 and find where the writers talk about the purposes of doing particular steps.

Begin *We recruited …*

2. Now rewrite the methods section you just wrote using the less personal, more formal scientific style.

Begin: *Eight male students of roughly the same age were recruited...*

3. Share both the versions that you have written with your classmates and give one another feedback. Think about the following.

- Is every step of the methods included?
- Are the right tenses used?
- Are the forms of the active voice clauses and the passive voice clauses correct?
- Are the questions in steps in steps 6 and 8 appropriately included?

Task 3: Reviewing your progress in data gathering

Use any time left in this lesson to review the progress of your group in collecting data.

- How many interviews have you done?
- How many participants have taken part in your experiments?
- What problems or difficulties have you faced?
- Do you need to change any of your methods?
- If for any reason your group has not collected any data. Please ensure that each member conducts at least one interview and has at least one participant do the experiment before the next lesson.

Lesson 8: Drafting your methods section

Introduction

In this lesson you will write the first draft of your methods section. Although you will write your draft individually, you will be asked to share your draft with your classmates and get comments from them.

Before you begin writing, there are some tasks for you to do in order to review what content you need to include and what language forms you will use.

Task 1: Preparing the content

Discuss with your group the following questions.

1. What information do you need to provide about the participants in your interviews and experiments? (E.g. age? gender? educational level?)
2. What information do you need to provide about how you recruited your participants?
3. What information do you need to include about any equipment or online resources you used?
4. What information do you need to provide about the questions you asked your participants?
5. How many steps are there in your experimental procedure and in what order should they be?
6. What information do you need to provide about how you analysed your results?

Task 2: Reviewing the use of tense and voice

Discuss with your group the following questions.

1. What is the main tense you will use in writing this section?
2. Is there any place in this section where you might use a different tense?
3. What voice (active or passive) will you mainly use in writing this section?
4. Is there any place where you might use a different voice?

Task 3: Using articles and pronouns to track people and things

We use articles and pronouns to keep track of the people and things we mention in a text. The following exercise is designed to remind you of some of the ways that you can do this in your methods section.

Fill in the gaps in the following text with i) a noun with no article (e.g. *water, students*), ii) a noun with an article (e.g. *the water, the students, a student*), or iii) a pronoun (including demonstrative pronouns) (e.g. *it, this, they, these*). Note that in some places more than one form may be possible. Be prepared to explain why you chose one form rather than another.

> Forty students from the university were recruited as participants in the interviews and experiments. _____ were aged between 17 and 23, as shown in Table 1. During _____, 11 questions were asked, ranging from _____ about their personal backgrounds to _____ about their opinions on certain situations related to the use of mobile phones.
>
> After completing the interviews, _____ were invited to participate in a reaction time (RT) test. To measure the RT of _____, an online reaction time test, the *Humanbenchmark Reaction Time Test* (see Appendix 1) was used. _____ were required to take _____ three times, each under different conditions. _____ were required first to touch the blue screen to start the test, then to wait for the red screen to turn green and touch _____ again. The procedure was repeated 4 more times. For the first trial, which was the control, _____ were asked to do _____without distraction (i.e. without texting or making a call). During the second trial, _____ were asked to text with both hands while doing _____. During the last trial, participants were on a phone conversation while doing _____ with one hand.

Task 4: Writing the first draft of your methods

A. Preparing to write

Make sure you have with you all the information you discussed in Task 1 above. Also think about what tenses and voices you will be using.

B. Writing

Now write your first draft. If possible, type it into google docs or a similar application so that you can easily share it with your group mates and with your teacher.

Don't worry about getting every word correct, but try to make sure you include all necessary content in a logical order.

C. Commenting and checking

The members of each group should now read through the drafts of all their fellow group members. Consider the following questions and give one another feedback.

- Is there anything missing?
- Are there any parts that are not clear?
- Are there any parts that need expanding (= making longer)?
- Does every sentence have at least one finite clause?
- Does every finite verb have a subject?
- Are appropriate tenses used?
- Are appropriate voices (active or passive) used?
- Are articles and pronouns used appropriately to track people and things through the text?

C. Editing your draft

When you have received your group mates' comments, make any changes to your own draft that you think are necessary. Don't worry if it is still not complete or "perfect". You will have time to work on it again later.

Task 5: Pooling and analysing your results

Use any time left in this lesson to pool (put together) all the results your group has collected and if possible begin analysing the results.

Lesson 9: Presenting and Describing Results

Introduction

In the results section of your report you need to display and describe the results of your research. Very often your results will be in the form of numbers, and you can display these using various kinds of graphs or tables. You will also need to describe your results in words, drawing attention to the most important, interesting or surprising findings.

In this lesson, you will look at ways of displaying and describing results using two different kinds of graphs. You will also practice describing some results yourself.

VOCABULARY PREPARATION

Read through Task 1 below. Find the words that are in bold type and use these words to complete the following sentences.

1. _____is a relatively formal verb. When we _____ something we put it down somewhere or leave it somewhere.
2. _____ is an adverb. When something happens _____, it happens slowly, or bit by bit.

Task 1: Reading a description of trends

Sometimes we may need to report results showing trends, i.e. how a situation changes over time. A common way to do this is to use a line graph.

A. Here is a simple line graph followed by a short description of what it shows. Take a look at the graph and the description below it and answer the questions below them.

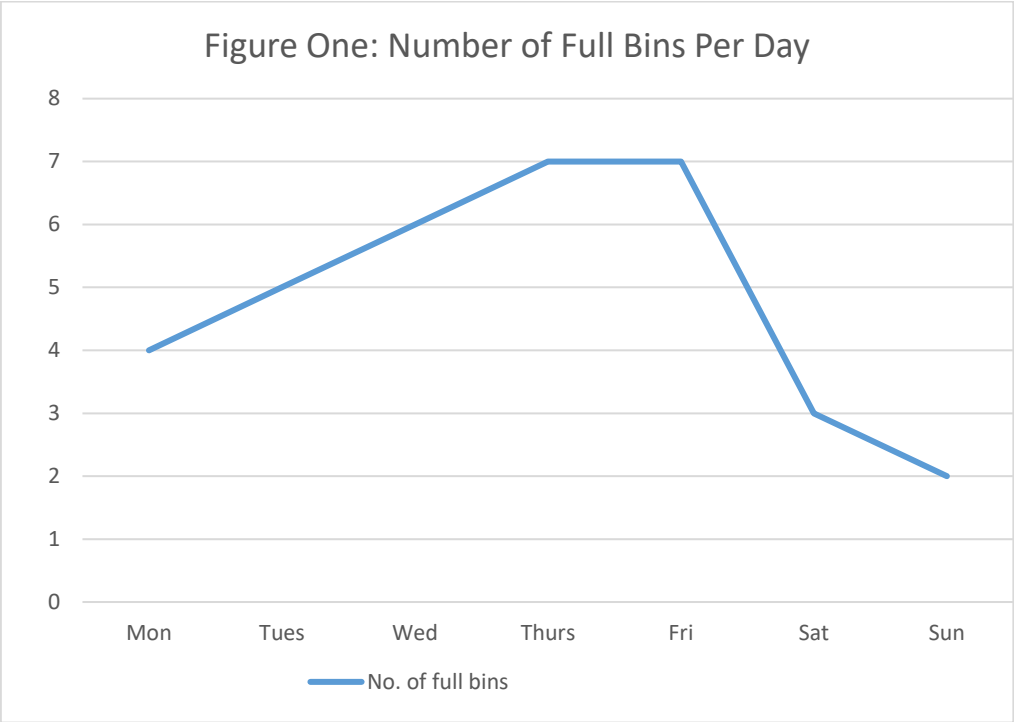


Figure 1 shows the number of bins on the campus found to be full of rubbish at the end of each day of the week. The amount of rubbish **deposited** increased **gradually** from Monday to Thursday. On Friday, roughly the same amount of rubbish was deposited as on Thursday. The amount then fell sharply on Saturday, and further decreased on Sunday.

1. What does the horizontal axis show?
2. What does the vertical axis show?
3. "...found to be full of rubbish ..." Who found the bins to be full of rubbish?
4. Why is it "<u>number</u> of bins" but "<u>amount</u> of rubbish"?
5. "Increased" is the opposite of "decreased". What would be the opposite of "fell"?
6. All the finite verbs are in past tense except the first one ("shows"). Why is this in present tense?
7. Which words in the description could you replace with "slowly" and "suddenly" without greatly changing the meaning?

Task 2: Exploring vocabulary and grammar for writing about trends

Here are some verbs that can be used to describe trends. Check that you know what they all mean.

1. Which indicate that something goes up/gets more?
2. Which indicate that something goes down/gets less?
3. Which indicates that it does both?

VERB	UP	DOWN	BOTH
increase			
decrease			
shrink			
expand			
drop			
fall			
rise			
fluctuate			
decline			

Look at the following rewriting of one clause from the text in Task 1.

> Original text: *The amount of rubbish deposited increased gradually from Monday to Thursday...*
>
> Re-written text*: From Monday to Friday there was a gradual increase in the amount of rubbish deposited...*

The verb *increased* in the original sentence has been nominalised as the noun *increase* in the second sentence. What other words have changed their parts of speech?

Try rewriting the following sentence (two clauses) in the same way.

> *The amount fell sharply on Saturday, and further decreased on Sunday.*

The verbs that can be used to describe trends are listed again in the table below. Check that you know how to use these verbs in the past tense and how to change them into nouns. Then complete the table. Note that most, but not all, of them have the same forms as verbs and nouns. If you are not sure, check in a dictionary.

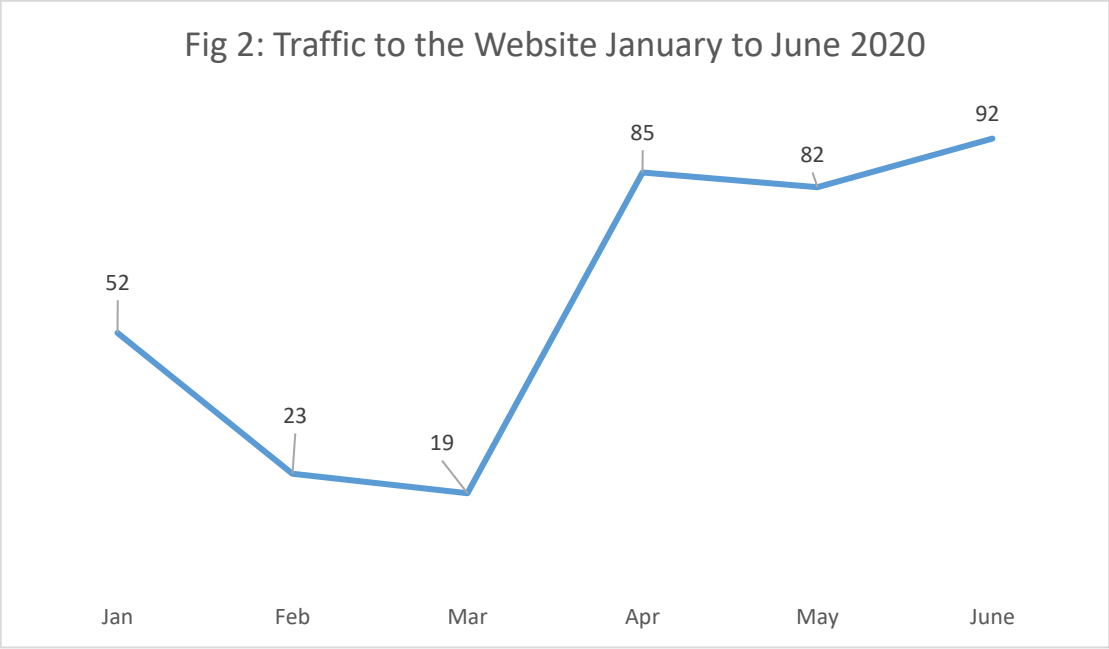
VERB	PAST TENSE	NOUN
increase	increased	increase
decrease		
shrink		
expand		
drop		
fall		
rise		
fluctuate		

Two adverbs, *gradually* and *sharply*, are used in the text in Task 1. They indicate whether the change in the amount of rubbish deposited was slow or fast. As we saw above, the adjective forms, *gradual* and *sharp*, have to be used before the nouns *increase* and *fall*. Here are some more adverbs/adjectives that can be used to describe changes. Check that you know the meaning of all of them. Which of them say something about the speed of change, and which of them say something about the amount of change?

slightly/slight, steadily/steady, rapidly/rapid, hugely/huge, steeply/steep, suddenly/sudden

Task 3 : Writing a Description of Trends

Write a description of the results displayed in the following line graph, which shows trends in the number of visitors to a certain website during its first six months online after it was launched in January 2020.



VOCABULARY PREPARATION

Read through task 4 below and find the words and phrases that are explained in the following sentences. Then do the task.

1. _____ is an adverb formed from the adjective _____. Something that is _____ is big enough or great enough to be considered important or worth noting.
2. The _____ of something is the place where it can be found or where it has been put. The noun _____ is related to the verb _____.
3. _____ is an adjective that describes something that has been used but can be processed so that it can be used again.

Task 4. Exploring ways of comparing of results

Bar graphs are useful for comparing results. Here is a bar graph displaying some results from a study of **recyclable** rubbish disposal on the campus of a Hong Kong university. Look at the graph, read the description below it and answer the questions.

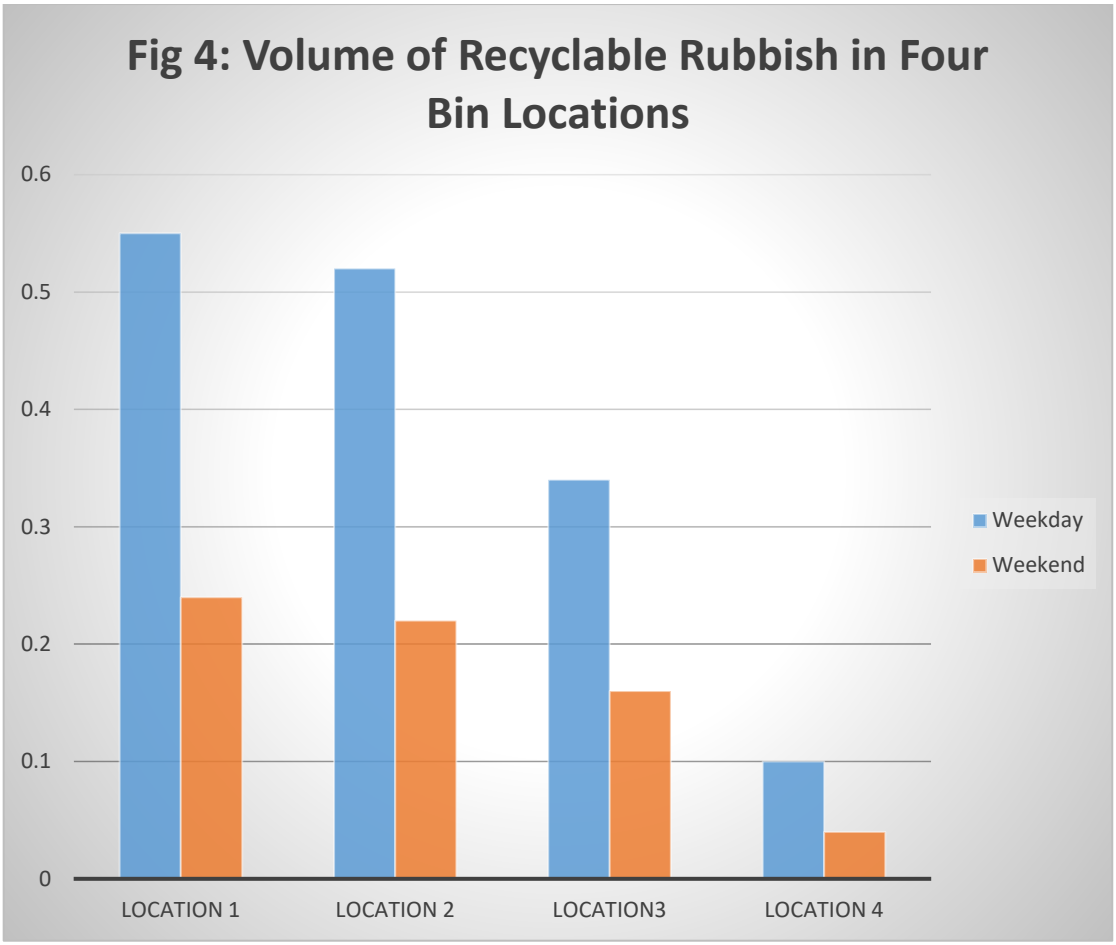


Fig. 4 shows the average daily volume of recyclable rubbish deposited in recycling bins at four different **locations** on weekdays and at the weekend. The bins at location 1 contained the highest volume of recyclable rubbish followed by those at location 2. In the bins at both these locations, the volume reached an average of over half a cubic meter (0.55m^3) on weekdays. The volume in the bins at location 3 was **significantly** lower than in the bins at locations 1 and 2 and the bins at location 4 contained the lowest amount of recyclable rubbish. The graph also shows that at all the locations more than twice as much recyclable rubbish was deposited on weekdays as at the weekend.

1. How often did the researchers record the volumes of rubbish and how did they analyse the numbers they recorded? Which two words in the first sentence give us the answers to these questions?
2. Why are two different colours used in the bars?
3. What does m^3 mean?

4. Complete the following five sentences about the above results with phrases using forms of the adjectives *low* and *high*. If you have any doubt, look back at how these adjectives are used in the text.
   a. 0.55 was ..... average daily volume of rubbish recorded.
   b. 0.04 was ..... average daily volume recorded.
   c. On weekends, at locations 3 and 4, average daily volumes..... 2 cubic meters were recorded.
   d. On weekdays, at locations 1 and 2, average daily volumes..... 5 cubic meters were recorded.
   e. At every location, the average daily volume recorded on weekdays was ..... at the weekend.

Here is some data from research into how people rated other people's levels of intelligence on a scale of 1 to 10 based only on hearing recordings of them speaking.

<u>Average ratings of intelligence (1 -10) for 6 speakers (S1 -S6) based on the recordings</u>

S1: 8.1 S2: 4.3. S3: 6.2. S4 :8 S5: 5.4. S6: 4.2

Based on the above data, complete the following sentences making comparisons as indicated. Use the adjective *intelligent*.

a. (S1 compared to all the other speakers)
Speaker 1 was judged to be .....

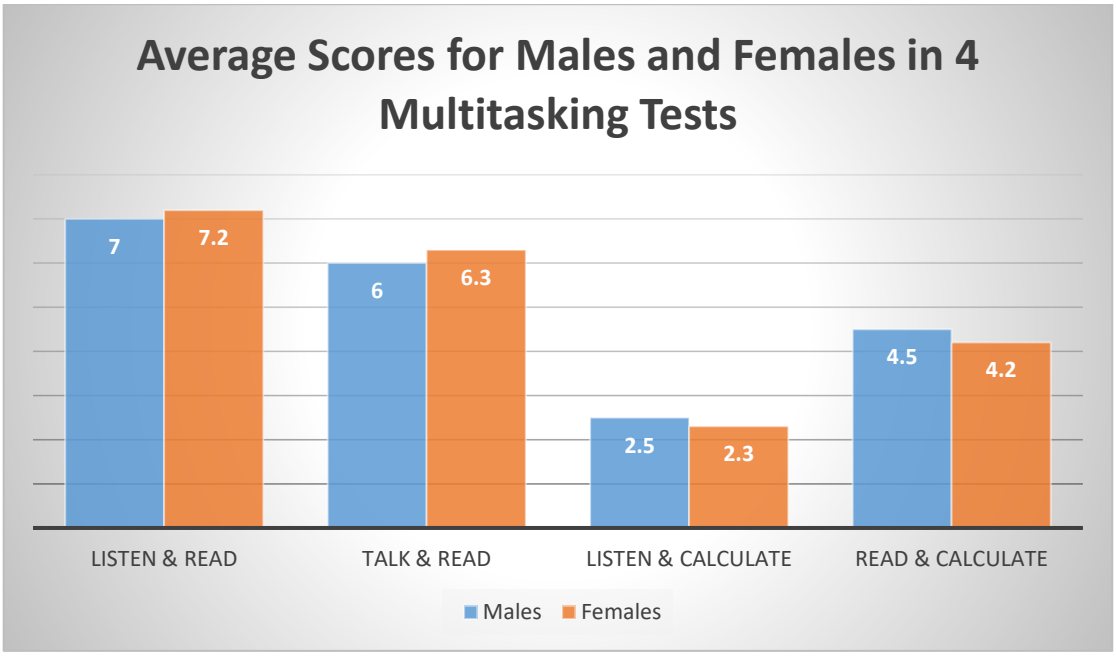
b. (S6 compared to all the other speakers)
Speaker 6 was judged to be .....

c. (S1 compared to S6)
Speaker 1 was judged to be .....

d. (S4 compared to S1)
Speaker 4 was judged to be .....

Task 5. Writing comparisons of results

Write a description of the results displayed in the following bar graph. Note that the maximum possible score for each test was 10.



Lesson 10: Drafting your results section

In this lesson you will write the first draft of your results section. Although you will write your draft individually, you will be asked to share your draft with your classmates and get comments from them.

Before you begin writing, there are some tasks for you to do in order to review what content you need to include and what language forms you will use.

Task 1: Preparing the content

Discuss with your group the following questions.

1. Has everyone finished collecting data?
2. What analyses of the results still need to be done?
3. So far, what are the most interesting or surprising results?
4. What are the best ways of displaying your findings (e.g. tables, line graphs, bar graphs)?

Task 2: Reviewing grammar and vocabulary

1. How many verbs can you remember that can be used to describe trends （e.g. *increase*）?
2. Brainstorm some adjectives you might need to use in order to compare results. Check that you know their comparative forms (e.g. *lower*, *more accurate*) and their superlative forms (e.g. *the lowest*, *the most accurate*).
3. Complete the sentences below describing the given pairs of numbers. Use the following words and patterns.
    - the adjectives *high* and *efficient*
    - *more* ADJECTIVE *than*
    - ADJECTIVE-*er than*
    - *as* ADJECTIVE as
    - *twice as* ADJECTIVE *as*
    - the adverbs *slightly, much, nearly*

    a) A =12 B = 13
    High: Answer: B is slightly higher than A.
    Efficient: Answer B is slightly more efficient than A.

    b) C = 14 D = 7
    High: C is .....
    Efficient: C is .....

    c) E = 14 F= 15
    High: E is .....
    Efficient: E is .....

    d) G = 5 H = 14;
    High: H is .....
    Efficient: H is .....

    e) I = 20 J = 20
    High I is .....
    Efficient: I is .....
4. What tenses are you likely to use when writing this section?

Task 2: Writing the first draft of your Results

A. Preparing to write

When your group has finished pooling your results and has done enough analysis to have something to report, select the results you will report, decide on the order in which you will report them and how you will report them.

B. Writing

Now write your first draft. If possible, type it into google docs or a similar application so that you can easily share it with your group mates and with your teacher.

Don't worry about getting every word correct, but try to make sure you include all necessary content in a logical order. Note that to create a graph in google docs you need to select *insert* > *chart* > *bar/column/line* (depending on the kind of graph you want). Then click on the graph that will appear in your document and select *open source* from the menu in the top right-hand corner of the graph. Then just enter your data into the source file. If you are not yet ready to do this or are unable to do it, just write a note about the kind of graph you plan to create and what the vertical and horizontal axes will show.

C. Commenting and checking

The members of each group should now read through the drafts of all their fellow group members. Consider the following questions and give one another feedback.

- Are there any results missing?
- Are there any parts that are not clear?
- Is the data described accurately?
- Are appropriate graphs used?
- Does every sentence have at least one finite clause?
- Does every finite verb have a subject?
- Are appropriate tenses used?
- Are comparative structures used correctly?
- Are articles and pronouns used appropriately to track people and things through the text?

Lesson 11: Discussions and Conclusions

VOCABULARY PREPARATION

Read through Introduction below. Find the words that are in bold type and use these words to complete the following sentences.

1. _____ is a countable noun. It is related to the verb _____. When results _____ something, it means that because of the results, something else is likely to be true.
2. _____is a countable noun. It is related to the verb _____. When we _____ results, we make use of them in some way, for example to help us solve a problem.
3. _____ is a countable noun. It is related to the verb _____. When we _____an action, we suggest that it should be done.

Introduction

Once you have presented your results, you need to move on to the final two sections of your report, the Discussion and the Conclusion. Without these sections, it may be hard for other scientists to know what is worth paying attention to in your results or whether they have any value at all.

The main purpose of the Discussion section is to tell the readers what you think your results mean. It normally draws attention to which of the findings seem to be important, interesting or surprising and states how they relate to the hypotheses the researchers started with. It will also usually attempt to explain all or some of the results.

The Conclusion section sums up what the researchers want other scientists to 'take away' from their research. It usually briefly summarizes the most important or interesting things about your research and suggests some ***implications*** *or* ***applications*** *of the findings. It may also make some* ***recommendations*** *about what should be done based on the findings. In some cases, the conclusion may also say something about the limitations of the research and give suggestions for further research.*

VOCABULARY PREPARATION

Read through Task 1 below. Find the words that are in bold type and use these words to complete the following sentences.

1. _____ is an adjective formed from a verb. We use the adjective this adjective to describe something that happens that we did not think would happen, i.e., something that surprises us. The opposite of this adjective is _____.
2. When something is _____, it is important, interesting and worth paying attention to.
3. When we _____ to something that happens, we behave in a certain way because of what has happened. The noun related to _____ is _____.
4. _____ is an adjective that describes anything to do with moving. It is also commonly used as a noun to refer to machines that turn power (usually from oil, gas or electricity) into movement.
5. When we _____ something, we make an approximate or rough calculation of it that

Task 1: Examining a sample discussion and conclusion

Read the following discussion and conclusion sections from a research report and answer the questions that follow them. Note that each sentence has been numbered to help you answer the questions.

Discussion

(1) As the data from the interviews show, people rely on mobile phones for many purposes, and they believe that they need to use them in public areas in order both to keep up with their work when they are away from their workplaces, and to keep in contact with their friends and family. (2) This may be why people continue to use their mobile phones in public areas even though they know that when they are looking at their phones, or talking on their phones, they may **react** more slowly to **unexpected** events.

(3) It is **notable** that about half the interviewees thought that they could multi-task effectively using mobile phones. (4) However, the results of the experiments show clearly that their ability to focus on other tasks while using their mobile phones was greatly reduced.

(5) The findings from the experiments also show that texting has the greatest effect on reaction times. (6) This can be explained with reference to research by Reed and Robbins (2008) that shows how texting increases **motor**, visual and cognitive demands much more than simply talking on the phone, or looking at the screen.

Conclusion

(7) Although most people understand that using mobile phones can influence their reaction times, they greatly **underestimate t**he danger of using a mobile phone while walking or driving, and they are not aware of how a few seconds longer reaction time can make it much harder to avoid accidents. (8) It is important to find ways to make the general public more aware of the dangers of using mobile phones in public places, and especially the danger of texting.

1. Why do you think the writers use the phrase "It is notable" at the beginning of paragraph 2? Do you agree that the findings reported in this paragraph are "notable"?

2. Find the sentence in the Discussion where the writers suggest an explanation for some of their findings. Does this seem to you to be a good explanation?

3. Find the sentence in the Discussion where the writers say that their findings could explain something else. How certain are they of this? Which word tells you how certain they are?

4. Find the sentence in the Conclusion that expresses a general implication of their findings.

5. Find the sentence in the conclusion that makes a recommendation based on their findings. Which phrase makes it clear that it is a recommendation?

6. What is the main tense used in both the Discussion and the Conclusion?

7. Past tense is used once. Why is it used? Could present tense be used instead?

Task 2: Making claims about your results

In the Discussion and Conclusion sections, when you talk about how your results or findings relate to your hypotheses, you are making claims. When scientists make claims based on their research, they always do so carefully, taking care not to exaggerate. When you are talking about your own results, you should also be careful about the claims that you make. You will often need to choose words and phrases that "soften" the claims. Even when you think that the results are clear, you should avoid making claims that are too strong. For example, instead of saying that the results of your research 'prove' that a hypothesis is true, you can say that they 'support' it. Similarly, instead of saying that the findings "show" that something is the case, you can say that they "suggest" that something is the case.

Look at the following sentences. They are all about how the results from research into use of mobile phones either support or do not support one of the hypotheses of the study. Look at the wording of each group of three sentences and rank (order) the three sentences according to how much the writers soften their claim, i.e. how much certainty/doubt they express about whether the hypothesis is correct or not. Use a scale from 1 ("certain", "no doubt") to 3 ("possible", "quite a lot of doubt").

Hypothesis: Using mobile phones reduces reaction times.

Results supporting the hypothesis

a. These results support the hypothesis that using mobile phones reduces reaction time.
b. These results confirm the hypothesis that using mobile phones reduces reaction times.
c. These results seem to support the hypothesis that using mobile phones may reduce reaction times.

d. These results indicate that using mobile phone may reduce reaction times.
e. These results show that using mobile phones reduces reaction times.
f. These results suggest that using mobile phones reduces reaction times.

Results not supporting the hypothesis

g. These results throw some doubt on the hypothesis that using mobile phones reduces reaction time.
h. These results contradict the hypothesis that using mobile phones reduces reaction time.
i. These results do not support the hypothesis that using mobile phones reduces reaction times.

j. These results show clearly that using mobile phones does not reduce reaction times.
k. These results indicate that using mobile phones may not reduce reaction times.
l. These results suggest that using mobile phones does not reduce reaction times.

Which words and phrases in the sentences helped you to decide on the rankings?

Now look at some of the results from your own study. Which seem to support your initial hypotheses and which do not seem to support them?

Write at least three sentences saying whether or not your findings support your hypotheses/answer your research questions. Make sure that in each case you express an appropriate level of certainty/doubt.

Task 3: Explaining your results

In the discussion section, you should also try to explain your results. In doing this, you will again be making claims that may need to be softened. Sentences a. to f. explain why one of the findings of the research into mobile phone use was that texting reduces reaction times more than talking on the phone or looking at the screen.

As in task 2, look at the wording of each sentence and decide how much the writers soften their claim, i.e. how much certainty/doubt they express about whether their explanation is correct or not**.** Use a scale from 1 ("certain", "no doubt") to 3 ("possible", "quite a lot of doubt").

Explanation for why texting slows reaction times more than other mobile phone uses

a. This is probably because texting increases visual, cognitive and motor demands.
b. This is because texting increases visual, cognitive and motor demands.
c. This could be because texting increases visual, cognitive and motor demands.

d. It is likely that this is because texting increases visual, cognitive and motor demand.
e. It is possible that this is because texting increases visual, cognitive and motor demands.
f. It is clear that this is because texting increases visual, cognitive and motor demands.

Now look at some of your results and think about how you can explain them. Write at least three sentences using words and phrases from sentences a. to f. above, giving explanations for some of your findings. Make sure that in each case you express an appropriate level of certainty/doubt.

Lesson 12: Preparing the Whole Report

In this lesson you will write the first draft of your discussion and conclusion sections. You will then put together all the sections that you have drafted to make a complete report. Although you write your own drafts individually, you will as usual be asked to share them with your classmates and get comments from them.

Task 1: Preparing the content of your discussion

Discuss the following questions with your group. Note that you may have already begun to discuss some of these questions in lesson 11.

- What do you think are the most interesting, important or surprising of your results?
- Which results seem to support your initial hypotheses or answer your research questions?
- Which results do not seem to support your initial hypotheses or seem to give unexpected answers to your research questions?
- How certain/doubtful are you about how these results support or do not support your hypotheses / answer your research questions?
- How do your results compare with previous research (especially previous research that you mentioned in your introduction)?
- What explanations can you find for some of your results?
- How confident (certain/doubtful) are you about each of your explanations?

Task 2: Writing the first draft of your discussion

When you are sure you have all the information you need, write the first draft of your discussion section. Don't worry too much about getting the grammar correct or about using exactly the right words. It just needs to intelligible, with all the information logically organized.

After you have written the draft, exchange your draft with those of <u>at least</u> two other class members. When you have received your fellow students' drafts, give them comments on the following:

- Are there are any parts that are difficult to understand?
- Are interesting or important results clearly summarized?
- Are the results related to the initial hypotheses/research questions?
- Are some of the results explained? Do any explanations seem logical and plausible (= believable, likely to be true)?
- Can you suggest anything else that should be added?

Task 3: Writing the second draft of your Discussion

Having read or heard your classmates' comments on your draft, if necessary add extra information, delete information or rearrange information.

Now rewrite your draft, paying particular attention to the following.

- What tenses do you use? Do you use them correctly?
- Does every sentence have at least one finite verb? Does every finite verb have a subject?
- Check your use of countable and uncountable nouns. Do you use singular and plural forms correctly with the countable nouns? Do you use appropriate articles and pronouns?
- Do you use appropriate words and phrases to soften (express doubt about) your claims where necessary?

Again exchange your draft with those of <u>at least</u> two class members. When you have received your fellow students' drafts, read them through noting any places where you think their grammar or vocabulary could be improved, paying particular attention to the features listed above.

When you get your draft back, look at all your classmates' comments on your grammar and vocabulary and make any necessary changes.

Task 4: Preparing the content of your conclusion

In your groups, discuss the following.

- What is the main implication of your research?
- What recommendations can you make based on your research?
- What are the limitations of your research?
- Can you suggest what kind of research on the topic should be done in the future?

Task 5: Writing the first draft of your conclusion

When you are sure you have all the information you need, write the first draft of your conclusion section. Don't worry too much about getting the grammar correct or about using exactly the right words. It just needs to intelligible, with all the information logically organized.

After you have written the draft, exchange your draft with those of at least two other class members. When you have received your fellow students' drafts, give them comments on the following:

- Are there are any parts that are difficult to understand?
- Are the implications of the research clear?
- Are any recommendations given? Do they follow logically from the research results?
- Does anything need to be added?

Task 6: Writing the second draft of your conclusion

Having read or heard your classmates' comments on your draft, if necessary, add extra information or rearrange the information.

Now rewrite your draft, paying particular to grammar and vocabulary. As before, check carefully for mistakes in tenses, sentence structure (subjects and finite verbs), countable and uncountable nouns, and articles.

Exchange your draft with those of at least two class members. When you have received your fellow students' drafts, read them through, noting any places where you think their grammar or vocabulary could be improved.

When you get your draft back, look at your classmates' comments on your grammar and vocabulary and make any changes you think are necessary.

Task 7: Putting it all together

Put together all the sections of your research report that you have drafted and read the report through.

- Do all parts of the report fit logically together? Are they in the right order?
- Are there any places where you are still not sure that your grammar or vocabulary is correct? If necessary, you might want to ask a fellow student or your teacher.
- Can the report be improved by adding something? For example, you might want to add more references to previous research or you might want to find a reference to a better definition of a key term in your research. Don't worry if you can't find what you need right now. Just make a note on your draft. You will still have two weeks before you need to submit the report and so you can search for references after class.

Now exchange your report with that of at least one other classmate.

When you receive your classmate's report, make any comments you think are necessary on the language and content.

When you get back your own report, look through your classmates' comments and see if there is anything you do not agree with, or you do not understand. If there is, discuss it with your classmate, and if necessary ask your teacher's opinion.

Task 8: Editing and submitting the final version

You will have time before you need to submit your report to go through it again, adding anything you think should be added, changing anything that you think should be changed and doing a final check of the vocabulary and grammar.

Your teacher will assess your submitted research reports as follows.

1. *Publishable*. This means that your report is good enough to be published by being uploaded to the course website.

2. *Publishable after minor revisions*. This means that your report can be uploaded to the course website after you have made a few changes.

3. *Publishable after major revisions*. This means that you will need to do quite a lot of re-writing before your report can be uploaded.

4. *Rejected*. This means that your report has so many problems that it is not worth taking the time to re-write it. If you have participated in all the tasks during this course, and taken care to edit your report before submitting it, it is very unlikely that your report will be rejected.

Your teacher will show you the assessment sheet that he or she will be using to decide how to assess your report. You can use this sheet yourself as a final check list before you submit your work.

CONGRATULATIONS ON COMPLETING THIS CHALLENGING COURSE

Assessment Sheet for Scientific Reports

Writer's name

Class

Return email

<table>
<tr><td colspan="2">CHECKLIST

If the assessor of your report ticks or writes YES against every comment in this checklist, the overall assessment of your report will be publishable. This means that your report is good enough to be published by being uploaded to the course website. Well done!</td></tr>
<tr><td>Content</td><td>Language</td></tr>
<tr><td colspan="2">Introduction</td></tr>
<tr><td>The research area/topic is introduced and explained with some clear and relevant generalisations or definitions.

At least two references are made to relevant previous research.

In-text citations are used appropriately and all references are listed at the end of the report.

The research questions or hypotheses of the research are clearly stated and follow on logically from the explanation of the research area.

The elements within the Introduction section are logically organized</td><td>Appropriate choices of vocabulary, grammar and formats are made in expressing:

• generalisations and/or definitions

• reporting previous research

• citing and referencing sources

• stating hypotheses and/or research questions.</td></tr>
<tr><td colspan="2">Methods</td></tr>
<tr><td>All necessary information about the context, the participants and tools used (e.g. questionnaires, video clips, mood scales etc.) is included.

The steps in the methods used are clearly stated and the steps are arranged in a logical order.</td><td>Appropriate tense and voice are used consistently in describing the steps.

Pronouns and articles are used appropriately so that it is always clear who or what is being referred to.</td></tr>
<tr><td colspan="2">Results</td></tr>
<tr><td>All relevant results are clearly reported and compared (where relevant).

The elements within this section are logically organized.</td><td>Appropriate vocabulary and tenses are used in reporting results and referring to diagrams/tables.

Appropriate grammatical structures are used for comparing results.</td></tr>
</table>

Discussion and Conclusion	
The readers' attention is drawn to the most interesting/important/ unexpected findings. Some reasonable claims are made about possible reasons for the results, and/or implications of the results, and/or applications of the results. The elements within this section are logically organized	Appropriate hedging language is used to "soften" claims where necessary.
General	
The report has all the necessary sections (Introduction, Methods, Results, Discussion Conclusion) in the right order.	There are no mistakes in vocabulary, grammar or punctuation OR there are a **few** minor mistakes, for example, missing/wrong punctuation mark, missing/ wrong article, minor spelling error; missing "s" on 3rd person sing. verb or plural countable noun, minor spelling mistake. They can all be easily fixed by a proof reader.

OVERALL ASSESSMENT	**Publishable**	**Publishable after minor revisions***
	Rejected*	**Publishable after major revisions***

*Please see notes below to see explanations of these categories.

ADDITIONAL COMMENTS:

Notes

If the assessor of your report has NOT ticked or written **YES** against one or more comments in the checklist, he or she may give one of the following assessments.

- ***publishable after minor revisions***
- ***publishable after major revisions***
- ***rejected***

Publishable After Minor Revisions

This means that you have a small amount of re-writing to do.

Look at which comments do NOT have a tick/ ***yes*** to discover where the problems are.

Any problems with **content** should be quite easy to fix, usually by adding something (e.g. another generalization, another reference to previous research, a missing step in the methods, missing references at the end of the report etc.), by clarifying (making clear) what you have written, by removing something that is not relevant or by reordering some of your points.

There may also be some **language** mistakes (i.e. in grammar or vocabulary). It should be quite easy for you to correct them yourself once you have spotted them. If you are unsure, check in a grammar book or ask your English teacher.

Please make the necessary revisions and resubmit your report for re-assessment.

Publishable After Major Revisions

This means you have to quite a lot to do to make your report publishable.

Look at which comments do NOT have a tick/***yes*** to discover where the problems are.

Some problems with **content** could take quite a lot of work to fix, for example one or more important elements may be missing entirely or need to be greatly expanded. In one or two places it may be hard to follow the logic of what you have written, and so re-writing will be necessary.

There may be quite frequent mistakes in vocabulary, grammar and/or format. It should be possible for you to correct them yourself, but you may need to refer to the relevant lesson notes, to dictionaries and/or to grammar reference books or your English teacher. Occasionally the mistakes may make your text hard to understand, so before you re-submit it would be useful to ask someone to read it and make sure they understand everything.

Please make the necessary revisions and resubmit your report for re-assessment.

Rejected

This means that your report has so many problems that it is not worth spending time trying to revise it. This could be because one or more sections of the report are missing entirely, or that nearly every sentence in the report has a major mistake in grammar or vocabulary, or that it is clear that you did not complete your research project

優質教育基金
Quality Education Fund

香港城市大學
City University of Hong Kong

Genre-based Approach to Enhancing Secondary Students' English Writing Ability in Science Subjects

PowerPoint Learning Tool

City University of Hong Kong, Department of English
&
Quality Education Fund

QEF project no. 2017/0884

Lesson 1: What is scientific research?

Department of English
City University of Hong Kong
QEF project no. 2017/0884

What will we learn today?

- **What** do a scientists do?
- **How** do they talk about what they do?
- **Who** do they talk to about what they do?

QEF project no. 2017/0884

Grouping

- **3-4 students** in a group
- One student becomes **a leader**
- Other students become group members

QEF project no. 2017/0884

Pre-Listening - Profile of a scientist

- **Now, please report your observations to me in a group:**

1. What types of people do research?
2. What does it take to be a "good" scientist (e.g. personality, skills) ?
3. What types of activities do scientists do (e.g. procedures)?
4. How do scientists go about conducting research?

Image: NASA

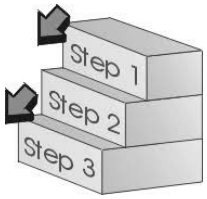
QEF project no. 2017/0884

Language Learning Opportunities

Observations (觀察**)** ***noun*****:**
Statements based on something one has seen, heard, or noticed.

Procedures (步驟**)** ***noun*****:**
An official way of doing something

Conducting (進行**)** ***verb*****:**
Organizing and carrying out something.

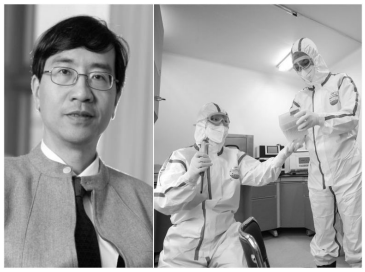


QEF project no. 2017/0884

A scientist in Hong Kong

Professor Yuen Kwok-yung

- Conducted research on SARS and COVID-19



QEF project no. 2017/0884

Listen and take notes

Now, watch the videos and pay attention to the questions below:

1. What is **misunderstood** about scientists?
2. What kind of **skills** do scientists need in their job?
3. What does she say is **'really great'** about science?

QEF project no. 2017/0884

Did you get…

- One of the most misunderstood things about science is that people believe that scientists are people with **electrical wires** and lights flashing in their hair or whatever. And they sit around in their offices and they **crab away (slang),** or [in] their labs, and they're very **solitary** kinds of people.
- It involves skills with understanding, being friendly, knowing these people, having a good time with these people, talking to them, cooking them a meal, whatever it is.
- One of the most wonderful things that can happen is to find something out that you had no idea that it was going to be there at all. And then, all of a sudden, the entire picture of what we've been interested in for 30 years is completely different.

QEF project no. 2017/0884

Language Learning Opportunities

Electrical wires (電線) *noun*:
(metaphor)
A scientist is liked a computer.

Solitary (單一) *adjective*:
A solitary person or thing is the only person or thing in a place.

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Listen again and take notes

1. **What characteristics** of a good scientist does he mention?
1. What is the **most important aspect** of being a scientist?
1. What is the most **difficult requirement**?

QEF project no. 2017/0884

Did you get…

- I would say one of the most important **ingredients** is curiosity. You really have to be just naturally **inquisitive** and curious about the world around you.
- But I think the most important aspect is **drive.** They really have to be **motivated** to understand and answer that question.
- And so one of the most important features, **ironically**, for scientists is the ability to write. It turns out that that is perhaps the most difficult requirement, ultimately, for being a good scientist.

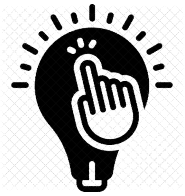
QEF project no. 2017/0884

Language Learning Opportunities

- **Ingredients (配料) *noun*:**
Characteristics
- **Inquisitive (好奇) *adjective*:**
Curious
- **Drive (動力) *noun*:**
Motivation

QEF project no. 2017/0884

Language Learning Opportunities



- **Motivate (啟發) *verb:***
Inspire
- **Ironically (諷刺地) *adjective:***
Used in reference to a unexpected situation
- **Ultimately (最終) *adverb:***
Finally or in the end

Page 12_Task 1B

The basic sequences of a scientific investigation

- A framework of scientific investigation

(a) Form a hypothesis (plural = hypotheses)

(b) Obtain data

(c) Analyze data

(d) Report results

(e) Coming to conclusions

Page 13_Task 2

Name the steps in scientific discovery

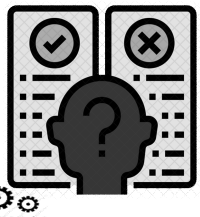
❖What do you think are the name of these steps?

- Find some information that can help you test your hypothesis. You might do this by observing, by counting, by measuring, by interviewing, by doing experiments etc.
- Look for patterns in your data. You might do this by using calculations or statistics, by comparing data, by grouping data etc.
- Prepare to communicate your findings. You might do this by describing, comparing and contrasting in words, by using tables and graphs etc.
- Make a statement about something that (a) you not sure is true or not; (b) you would like to find out if it is true or not, and(c) you think it may possible to find out whether it is true or not
- Interpreting your results and deciding what is most interesting or significant.

Page 14_Task 2

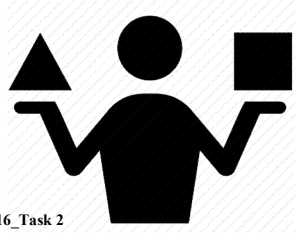
Language Learning Opportunities

- **Hypothesis (假設) *noun:***
  - an idea or explanation for something that is based on known facts b ut has not yet been proved
- **Interpret (翻譯) *verb:***
  - to decide what the intended meaning of something is
- **Analyze (分析) *verb:***
  - to study something in detail



Page 15_Task 2

Language Learning Opportunities



- **Sequences (順序) *noun:***
  - Particular orders in which related things follow each other.
- **Compare (比較) *verb:***
  - to find similarities
- **Contrast (對比) *verb:***
  - to find differences

Page 16_Task 2

(Answer) Name the steps in scientific discovery

❖What do you think the name of these steps?

Obtain data

Analyze data

Report results

Form a hypothesis

Coming to conclusions

Page 17_Task 2

Text 1

Oxygen is an important element that is needed by most life forms on earth to survive. It is the third most **abundant** element in the universe and the most abundant element in the human body. Oxygen has eight **electrons** and eight **protons** and it is located at the top of column 16 in the **periodic table**.

Under standard conditions oxygen forms a gas that is composed of **molecules** consisting of two oxygen atoms (O2). This is called a diatomic gas. In this form oxygen is a colourless, **odourless**, tasteless gas.

Oxygen is found all around us. It is one of the most important elements on planet Earth. Oxygen makes up around 21% of the Earth's atmosphere and 50% of the mass of the Earth's **crust**. The oxygen that is found in the air is produced in plants by the process of **photosynthesis**. Without plants, there would be very little oxygen in the air. In the solar system, only the Earth has a high percentage of oxygen

Oxygen is an important element to life on Earth and both plants and animals use it in respiration. It is the most abundant element in the human body making up around 65% of the body's mass. Oxygen atoms make up an essential part of the proteins and DNA in our bodies.

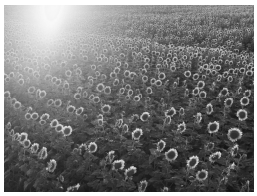
Tanks of oxygen are used in medicine to treat people with breathing problems. They are also used as life support for astronauts and **scuba divers**. The majority of the oxygen used in industry is used in the manufacturing of steel. Other applications include making new compounds such as plastics and creating a very hot flame for welding. Liquid oxygen is combined with liquid hydrogen to make rocket fuel.

Swedish chemist C. W. Scheele first discovered oxygen in 1772. He called the gas "fire air" because it was needed for fire to burn. Scheele did not publish his results right away and the element was independently discovered by British scientist Joseph Priestley in 1774.

QEF project no. 2017/0884

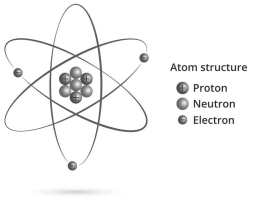
Glossary:

Abundant (豐富) *adjective*:
- existing or available in large quantities; plentiful.



electrons (電子) *noun*:
- a tiny particle of matter that is smaller than an atom (*) and has a negative electrical charge.

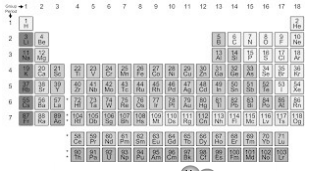
protons (質子) *noun*:
- a very small piece of matter with a positive electrical charge that is in the central part of an atom → electron, neutron



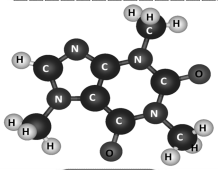
QEF project no. 2017/0884

Glossary:

Periodic table (原素表) *noun*:
- a table of the chemical elements arranged in order of atomic number



Molecules (分子) *noun*:
- form when two or more atoms form chemical bonds with each other

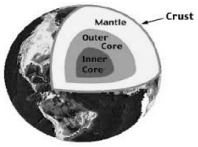


Odorless (無味的) *adjective*:
- having no smell

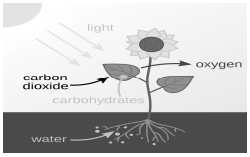
QEF project no. 2017/0884

Glossary:

Crusts (硬殼) *noun*:
- the tough outer part of something



Photosynthesis (光合作用) *noun*:
- a process used by plants and other organisms to convert light energy into chemical energy



Scuba divers (潛水員) *noun*:
- people who scuba dive, i.e. swim under water using a special type of equipment for breathing.

QEF project no. 2017/0884

Text 2

Oxygen is the name of a gas that is in the air that we breathe. Although it has no taste, no smell and no colour, it is a very important gas. If there were no oxygen in the air most living things on Earth (including us) could not live. We need oxygen to make many parts of our bodies.

Plants produce oxygen from another gas in the air called ***carbon dioxide***. Plants are able to separate carbon dioxide into carbon and oxygen by using sunlight. If there were no plants, there would be hardly any oxygen in the air at all. The Earth is the only planet in our **solar system** that has so much oxygen in its air.

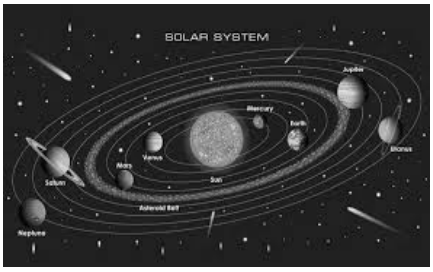
If someone has difficulty breathing, doctors use tanks full of oxygen to help them. Tanks of oxygen are also used by people who dive deep under the sea and by astronauts who travel into outer space. We also use a lot of oxygen in making steel. If you cool down oxygen enough, it becomes a liquid and liquid oxygen is one of the ingredients used to make rocket fuel.

A Swedish chemist called C.W. Scheele first discovered oxygen in 1772. He called the gas "fire air" because fire needs oxygen in order to burn. However, Scheele did not publish his results right away and oxygen was discovered again in 1774 by the British scientist Joseph Priestley, who did not know that Scheele had already discovered it.

QEF project no. 2017/0884

Glossary:

***S*olar system (太陽系) *noun*:**
- the sun and the group of planets that move around it



QEF project no. 2017/0884

Text 3

Oxygen is a chemical element with the symbol **O** and atomic number 8, meaning its nucleus has 8 protons. It is a member of the chalcogen group on the periodic table. It is a highly **reactive nonmetal**, and an oxidizing agent that readily forms oxides with most elements as well as with other compounds. By mass, oxygen is the third-most abundant element in **the universe**. At standard temperature and pressure, two atoms of the element bind to form dioxygen, a colourless and odourless diatomic gas with the formula O2. Diatomic oxygen gas constitutes 20.8% of the Earth's atmosphere.

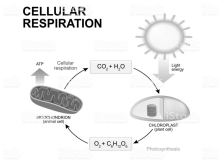
Dioxygen is used in **cellular respiration** and many major classes of organic molecules in living organisms contain oxygen, such as proteins, nucleic acids, carbohydrates, and fats, as do the major constituent inorganic compounds of animal shells, teeth, and bone. Oxygen is continuously replenished in Earth's atmosphere by photosynthesis, which uses the energy of sunlight to produce oxygen from water and carbon dioxide.

Oxygen was isolated by Michael Sendivogius before 1604, but it is commonly believed that the element was discovered independently by Carl Wilhelm Scheele, in Uppsala, in 1773 or earlier, and Joseph Priestley in Wiltshire, in 1774. Priority is often given for Priestley because his work was published first.

Uses of oxygen include production of **steel**, plastics and **textiles**, **brazing**, **welding** and cutting of steels and other metals, rocket **propellant**, oxygen therapy, and life support systems in **aircraft**, **submarines**, **spaceflight** and **diving**.

Glossary:

Cellular respiration (呼吸作用/細胞呼吸) *noun*:
- the process through which cells (細胞) convert sugars into energy.



Convert (轉換) *verb*:
- To change something and make it into something new.

The universe (宇宙) *noun*:
- all of space and time and their contents, including planets, stars, galaxies, and all other forms of matter and energy.

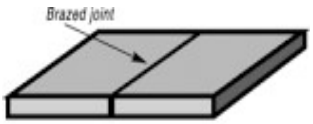
Glossary:

Steel (鋼) *noun*:
- a strong metal that is a mixture of iron and carbon.

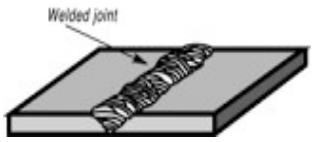
Textiles (紡織品) *noun*:
- a cloth made by hand or machine

Glossary:

Braze (硬銲) *verb*:
- joins metals by melting and flowing a filler metal into the joint



Weld (焊接) *verb*:
- joins metals by melting the base metal and causing fusion

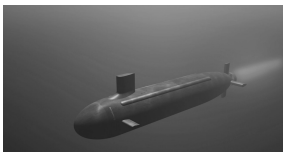


Glossary:

Propellant (燃料) *noun*:
- the fuel to create movement of the rocket.

Aircraft (飛機) *noun*:
- a machine that can fly, e.g plane, helicopter

Submarine (潛艇) *noun*:
- a ship that can travel underwater.



Glossary:

Spaceflight (太空飛行) *noun*:
- space travel

TASK 3: Describe and explain different kinds of writing in science communication

- Discuss the following questions.

1. Where do each of the texts probably come from?
2. What kinds of reader is each text probably intended for? [e.g. likely age, educational level; knowledge background]
3. How would you order the three texts in terms of how scientific their language is?
4. Which text contains the most information?
5. Which text is the longest?
6. Which text is the shortest?
7. Which text is the hardest for you to understand?
8. Which text is the easiest for you to understand?

Text Comparison

- What differences are there in the ways similar information is expressed in three texts? For example:

1. Are there places where everyday words are used in one passage and more formal or more scientific words are used in another?

2. Where scientific words are used, are they general scientific words that any educated English-speaking person might know, or are they words that only people who have studied science to an advanced level might know?

3. Are there places where similar information is expressed in grammatically different ways? For example, by different parts of speech (nouns, verbs, adjectives etc.) or by different sentence structures (e.g. active versus passive voice; simple sentences v. complex sentences)?

TEXT 1	*TEXT 2*	*TEXT 3*
Oxygen is an important element that is needed by most life forms on earth to survive	If there were no oxygen in the air most living things on Earth (including us) could not live.	
The oxygen that is found in the air is produced in plants by the process of photosynthesis.	Plants produce oxygen from another gas in the air called ***carbon dioxide.*** Plants are able to separate carbon dioxide into carbon and oxygen by using sunlight.	Oxygen is continuously replenished in Earth's atmosphere by photosynthesis, which uses the energy of sunlight to produce oxygen from water and carbon dioxide.
… oxygen is a colourless, odourless, tasteless gas.	… it has no taste, no smell and no colour ...	… a colourless and odourless [diatomic] gas ...
Without plants, there would be very little oxygen in the air.	If there were no plants, there would be hardly any oxygen in the air at all.	

TEXT 1	*TEXT 2*	*TEXT 3*
Oxygen atoms make up an essential part of the proteins and DNA in our bodies.	We need oxygen to make many parts of our bodies.	
Tanks of oxygen are used in medicine to treat people with breathing problems.	If someone has difficulty breathing, doctors use tanks full of oxygen to help them	… oxygen therapy ...
The majority of the oxygen used in industry is used in the manufacturing of steel.	We also use a lot of oxygen in making steel.	Uses of oxygen include production of steel ...
They are also used as life support for astronauts and scuba divers.	Tanks of oxygen are also used by people who dive deep under the sea and by astronauts who travel into outer space.	and life support systems in ……. spaceflight and diving.
Liquid oxygen is combined with liquid hydrogen to make rocket fuel.	If you cool down oxygen enough, it becomes a liquid and liquid oxygen is one of the ingredients used to make rocket fuel.	Uses of oxygen include production of … rocket propellant

Text Comparison (Cont'd) - answer questions

1. Which text has the most long noun groups?

[a noun group is a noun plus words that come before it and after it and are part of its meaning. For example: dog is a noun, my neighbour's noisy dog is a noun group with a possessive and adjective in front of it]

neighbour's noisy dog
[possessive] [adjective] [noun] = a noun group

[The noisy dog that my neighbour got recently to guard his house is a much longer noun group with a relative clause (a 'that'-clause) after it.]

noisy dog that my neighbour got recently to guard his house
[adjective] [noun] [relative clause] = a noun group

Text Comparison (Cont'd) - answer questions

2. Which texts has the largest number of short noun groups (including single nouns)?

3. Which text has the largest number of complex sentences?

4. Which text has the largest number of simple sentences?

Text Comparison (Cont'd) - final discussion

1. Of all the features of vocabulary and grammar that you have noticed in these texts, which are used more in texts that use scientific language, and which are used more on texts which use less scientific language?

1. Of all the features of scientific English that you have identified so far, which might be difficult for you to use correctly if you had to write a scientific text?

What did we learn today?

- **What** do scientists do?
- **How** do they talk to about what they do?
- **Who** do they talk to about what they do?

See you in the next lesson!

We will learn…

- What are some scientific genres?
- How to select topics for fieldwork?
- How to search/use online resources?

Lesson 2&3: Getting Started

Department of English
City University of Hong Kong

QEF project no. 2017/0884

What will we learn today?

By the end of this tutorial, you should be able to understand:

- What are some different ways of writing about scientific topics
- What a scientific report is.
- What kinds of writing may be found in scientific reports

QEF project no. 2017/0884

What is a scientific report?

A scientific report is a document that reports scientific research. There are many kinds of scientific reports, but they all normally contain at least something about the aims of the research, how the research was carried out and what the results were. Scientific reports are usually written by scientists for other scientists, but students of science also have to sometimes write scientific reports.

QEF project no. 2017/0884

Let's Learn… What is Tense(時態) ?

A method that we use to refer to time and aspect:

- Time:
  1. Past - before now
  2. Present - now, or any time that includes now
  3. Future - after now

- Aspect:
  1. progressive - uncompleted action
  2. perfective - completed action or state

QEF project no. 2017/0884

Below is a table that shows how these elements work together to form some basic tenses:

		Time		
		Past	Present	Future
simple (no aspect)		sang	sings	will sing
Aspect	progressive	was singing	is singing	will be singing
	perfective	had sung	has sung	will have sung

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Sentence structure (句子結構)

There are four types of sentences:

1. simple
2. compound
3. complex
4. compound-complex.

Each sentence is defined by the use of :

1. independent clauses
2. dependent clauses
3. conjunctions
4. subordinators

QEF project no. 2017/0884

1. Simple sentences:

A simple sentence is an independent clause with no conjunction or dependent clause.

E.g. I like tea. (SVO)
[An independent clause]

2. Compound sentences:

A compound sentence is two independent clauses joined by a conjunction (e.g., and, but, or, for, nor, yet, so).

E.g. I like tea and James likes coffee.
[An independent clause] [Coordinating conjunction] [An independent clause]

3. Complex sentences:

A complex sentence consists of an independent clause plus a dependent clause. (A dependent clause starts with a subordinating conjunction or a relative pronoun, and contains a subject and verb, but does not express a complete thought.)

E.g. Our dog barks when he *hears* a noise.
[An independent clause] [Relative pronoun] [Dependent clause]
[Subject] [*verb*]

4. Compound-complex sentences:

A compound-complex sentence contains multiple independent clauses and at least one dependent clause. These sentences will contain both conjunctions and subordinators.

E.g. Joanne didn't come because she was ill so Crystal was not happy.
[An independent clause] [Subordinating conjunction] [Dependent clause] [Coordinating conjunction] [An independent clause]

Conjunction (連詞)

Conjunctions are words that link other words, phrases, or clauses together.

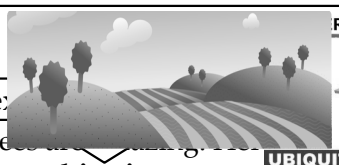
Three types of conjunctions:

1. Coordinating Conjunctions
   Allow you to join words, phrases, and clauses of equal grammatical rank in a sentence.
   E.g. for, and, nor, but, or, yet, and so. (fanboys)

1. Subordinating Conjunctions
   Subordinating conjunctions join independent and dependent clauses.
   E.g. although, because, if, since, unless, until, and while.

1. Correlative Conjunctions
   Are pairs of conjunctions that work together.
   E.g. either/or, neither/nor, and not only/but also.

Task : Identifying different kinds of writing about science



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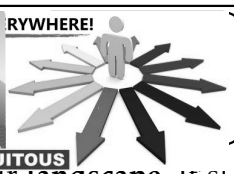
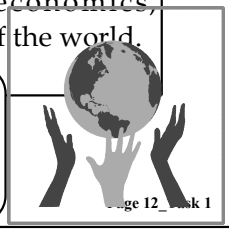


UBIQUITOUS

Te
Tr
are a **ubiquitous** part of our **landscape**. It s
hard to imagine a place in this state where you can't see a tree somewhere in your 360° view (Try it! And inside a building does not count). Trees provide countless benefits to our health and well-being, economics, societal resources, and **ecology** of the world.

Ecology (生態) ***noun*:**
the web of relationships among animals and plants and everything else in their environment



1. Who do you think this text may have been written for? Note that there could be more than one answer.
a) Professional scientists in general?
b) Experts in managing forests (called "foresters")?
c) Secondary school students studying science?
d) Young readers between about 12 years old and 18 years old?
e) Young readers under 12?
f) Well educated readers of any age?
g) Other?

Pick out some words and phrases that helped you to decide which answer to choose.

2. What seems to be the main purpose of this text?
a) Introducing a story about trees?
b) Introducing a general description of trees and their characteristics ("what they are like")?
c) Introducing some recent research about trees?
d) Introducing an argument that we should all do our best to protect trees?
e) Other?

What reasons do you have for your answer?

3. What do you think *a ubiquitous part* means?
a) A part that is very rare?
b) A part that is everywhere?
c) A part that is special?
d) A part that is beautiful?

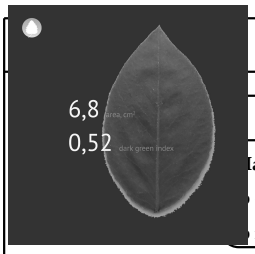
What other words or phrases in the text helped you to work out what *ubiquitous* means?

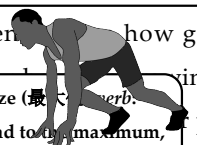
4. What do you think *ecology* means in this text?
a) All the relationships among animals and plants in their environments?
b) The shape of the landscape (hills, valleys, rocks etc.)?
c) Ways in which we humans rely on plants for our survival?
d) The study of the environment?

How did you decide on the correct answer?

5. Give some examples of the benefits of trees to *societal resources*.

6. Could this text have come from a research report? If no, why not? If yes, which part of the report might it have come from?
a) The **introduction** to the topic of the research?
b) The **aims** of the research?
c) How the research was carried out (the **methods**)?
d) What the **results** were?
e) How we might interpret or explain the results (**discussion)**?





how good the

ing, what

plants it

evelop its

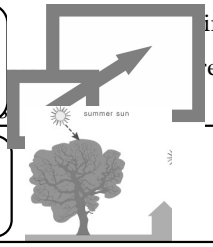
leaf **surface area** to **maximize** its ability to produce

ir leaves above

ea by layering

Maximize (最大化) *verb*:
to expand to the maximum,
to make as large as possible

Surface area (表面積) *noun*:
the area of a surface or of all of the outer surfaces of something



Orienting (定向):
to position in a certain direction, e.g. towards the sun

1. Who do you think this text may have been written for?
a) Professional scientists?
b) Foresters?
c) Secondary school students studying science?
d) Young readers between about 12 years old and 18 years old?
e) Young readers under 12?
f) Educated readers in general?

Pick out some words and phrases that helped you to decide which answer to choose.

2. What seems to be the main purpose of this text?
a) Introducing a story about trees?
b) Introducing a general description of trees and their characteristics?
c) Describing some recent research about trees?
d) Introducing an argument that we should all do our best to protect trees?
e) Other?

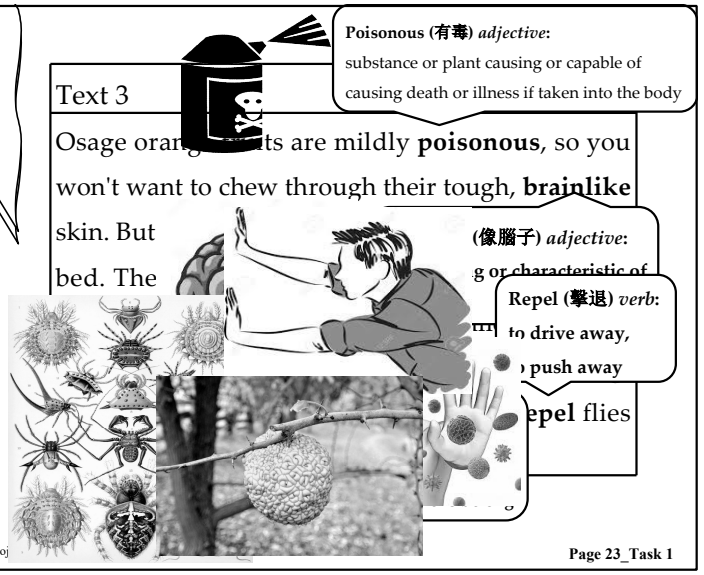
What reasons do you have for your answer?

3. What do you think *maximise* means in this text?

a) To make as small as possible?
b) To make as large as possible?
c) To make as useful as possible?
d) To make as clever as possible?

4. What do you think *orienting* means in this text?
a) Pointing upwards?
b) Moving towards the east?
c) Positioning in a certain direction?
d) Pointing downwards

5. Could this text have come from a research report? If no, why not? If yes, which part of the report might it have come from?
a) The **introduction** to the topic of the research?
b) The **aims** of the research?
c) How the research was carried out (the **methods**)?
d) What the **results** were?
e) How we might interpret or explain the results (**discussion)** ?



1. Who do you think this text may have been written for?
a) Professional scientists?
b) Professional gardeners?
c) Secondary school students studying science?
d) Young readers between about 12 years old and 18 years old?
e) Young readers under 12?
f) Educated readers in general?

Pick out some words and phrases that helped you to decide which answer to choose.

2. What seems to be the main purpose of this text?
a) Introducing a story about osage oranges?
b) Providing a general description of osage oranges and their characteristics?
c) Introducing some recent research about the effectiveness of using osage oranges to repel insects and arachnids?
d) Introducing an argument that we should use osage oranges to protect ourselves against flies and cockroaches (instead of using insecticides)?
e) Other?

What reasons do you have for your answer?

3. Why is the skin of osage oranges described as *brainlike*? (If you are not sure, google "osage orange" and find a picture of one.)

4. What are *hedge apples*? How do you know?

5. What do you think *ward off spiders* means?
a) to attract spiders
b) to shelter spiders
c) to kill spiders
d) to prevent spiders from harming you?

6. Which of the following are *arachnids*?
a) flies and cockroaches
b) spiders
c) all insects
d) poisonous animals

7. Could this text have come from a research report? If no, why not? If yes, which part of the report might it have come from?
a) The **introduction** to the topic of the research?
b) The **aims** of the research?
c) How the research was carried out (the **methods**)?
d) What the **results** were?
e) How we might interpret or explain the results (**discussion)** ?

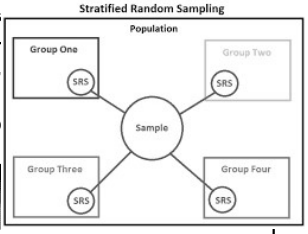
Borer (鑽孔器) *noun*:
a tool that bores (makes

height with a Pressler

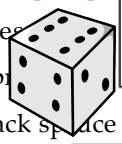
random trees per pl

ack sp ce and **stratified** on both

edge and **interior**

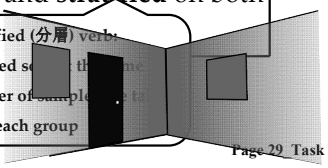


Random (隨機) noun:
a way of choosing things so that each item has an equal chance of being chosen



Stratified (分層) verb:
uped s th me
mber of sample ta
n each group

Interior (室內的, 內部的)
adjective:
The inside part of something



1. Who do you think this text may have been written for?
a) Professional scientists?
b) Foresters?
c) Secondary school students studying science?
d) Young readers between about 12 years old and 18 years old?
e) Young readers under 12?
f) Educated readers in general?

Pick out some words and phrases that helped you to decide which answer to choose.

2. What seems to be the main purpose of this text?
a) Introducing a story about trees?
b) Giving a general description of trees and their characteristics?
c) Describing some recent research into growing trees?
d) Introducing an argument about the best way to grow trees?
e) Other?

What reasons do you have for your answer?

3. The first sentence mentions *cores*? Cores of what? Where do *cores* come from?

4. The *Pressler borer* is a machine that was used in this research to do what?
a) Bore holes in order to plant trees?
b) Randomly select trees to study?
c) Take out sections of wood from inside trees?
d) Take out cores from a plot?

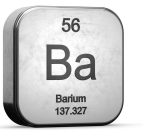
5. Try to complete the following sentences by filling in the gaps and choosing the correct alternatives. You should be able to find enough information in the text to do this without looking up any words in a dictionary.

Random and *stratified* are two ways of ……, i.e. choosing which items to include in a study. In *random/stratified* …….., each item has an equal chance of being chosen. In *random/stratified* …….., the same number of items are taken from each group.

6. Could this text have come from a research report? If no, why not? If yes, which part of the report might it have come from?
a) The **introduction** to the topic of the research?
b) The **aims** of the research?
c) How the research was carried out (the **methods**)?
d) What the **results** were?
e) How we might interpret or explain the results (**discussion)**?

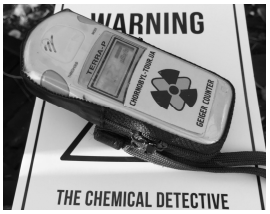
Text **5**

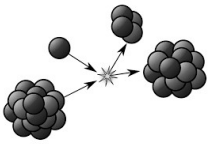
The students measure the barium immediately after it's prepared. Every minute, they record Geiger counter events for 10 or 15 seconds. After about a half-hour, the barium sample will decay to very low levels. When the students no longer detect radiation counts greater than background, they can stop. Because background radiation will inflate their counts, the students must subtract the background rate from the data they took. Finally, they can plot their results on graph paper to see the decay curve. When the experiment is done, safely pour the solution down the drain.



Barium (鋇) noun:
a metal, some forms of which are radioactive.

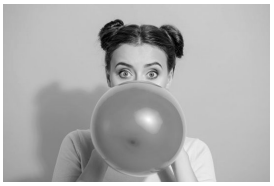
Geiger counter (蓋革計數器) noun:
a machine for measuring radioactivity.





To decay (衰變) verb:
in physics this refers to how the nucleus of an atom loses electrons and emits radiation.

To inflate (膨脹) *verb*:
to make something larger than it should be.



$$\begin{array}{r} 35 \\ -19 \\ \hline \end{array} \longrightarrow \begin{array}{r} {}^{2}\not{3}\,{}^{15}\not{5} \\ -19 \\ \hline 16 \end{array}$$

Subtract (減去) *verb*:
to take a number or amount away from another number or amount.

1. Who do you think this text may have been written for?
a) Professional scientists?
b) Foresters?
c) Secondary school students studying science?
d) Young readers between about 12 years old and 18 years old?
e) Young readers under 12?
f) Educated readers in general?

Pick out some words and phrases that helped you to decide which answer to choose.

2. What seems to be the main purpose of this text?
a) Telling a story about radiation?
b) Introducing a general description of barium and radiation?
c) Describing some recent research?
d) Giving instructions about doing some research?
e) Introducing an argument about the dangers of radiation?
f) Other?

What reasons do you have for your answer?

3. What do you think *barium* is?
a) A kind of plant?
b) A tiny animal?
c) A measuring tool?
d) A chemical element?

What words or phrases in the text helped you to work out what *barium* is?

4. What is *radiation* in this text?
a) Heat from the sun that keeps us warm but can also give us sunburn?
b) A pattern of lines from the centre of a circle to the edge of the circle?
c) An emotion that you can see by looking at someone's face?
d) A stream of very small particles that certain substances emit (= send out)?

What words or phrases in the text helped you to work out what *radiation* is?

5. What does *inflate* mean in this text?
a) To make something larger than it should be?
b) To make something less accurate than it should be?
c) To make something larger by blowing air into it?
d) To make something smaller by sucking air out of it?

What words or phrases in the text helped you to work out what *inflate* means?

6. Could this text have come from a research report? If no, why not? If yes, which part of the report might it have come from?
a) The **introduction** to the topic of the research?
b) The **aims** of the research?
c) How the research was carried out (the **methods**)?
d) What the **results** were?
e) How we might interpret or explain the results (**discussion)**?

Text 6

We don't need nuclear power. **Renewables** are ready to take over from nuclear. In fact, we could be producing 100% of our energy from renewables by 2050, and the technology is already ready for market – particularly if the **subsidies** for **fossil fuels** and **nuclear** are cut. Furthermore, if we don't start using renewable now then we may never make the switch, so this is the chance to take that first step.

Renewables (可再生能源) noun:
renewable forms of clean energy can be produced as quickly as they are used

Subsidy (補助金) noun; plural form: subsidies:
money given as part of the cost of something, to help or encourage it to happen

Nuclear (核) ***Adjective:***
relating to the power produced when the central part of an atom is divided or joined to another one

Fossil fuels (化石燃料) noun:
fuels, such as gas, coal, and oil, that were formed underground from plant and animal remains millions of years ago

1. Who do you think this text may have been written for?
a) Professional scientists?
b) Foresters?
c) Secondary school students studying science?
d) Young readers between about 12 years old and 18 years old?
e) Young readers under 12?
f) Educated readers in general?

Pick out some words and phrases that helped you to decide which answer to choose.

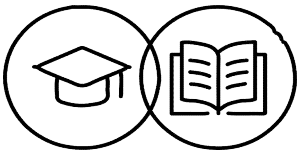
2. What seems to be the main purpose of this text?
a) Telling a story about nuclear power?
b) Introducing a general description of nuclear power and renewables?
c) Describing some recent research?
d) Giving instructions about doing some research?
e) Introducing an argument that we should stop using nuclear power?
f) Other?

What reasons do you have for your answer?

6. Could this text have come from a research report? If no, why not? If yes, which part of the report might it have come from?
a) The **introduction** to the topic of the research?
b) The **aims** of the research?
c) How the research was carried out (the **methods**)?
d) What the **results** were?
e) How we might interpret or explain the results (**discussion)**?

What did we learn today?

- By the end of this lesson, you can explain:
  - different ways of writing about scientific topics
  - what a scientific report is
  - the kinds of writing may be found in scientific reports



QEF project no. 2017/0884

See you in the next lesson!

We will learn…

- Describe a variety of sources of scientific information
- Evaluate the usefulness of these sources of information to your studies
- Plan and organize your group project, including English language learning opportunities
- Apply the principles discussed to identify appropriate information for your English for science project

QEF project no. 2017/0884

Review

- How similar or different are the following genres: scientific documentary, lab report?
- Consider:
  - The audience and purpose
  - The organizational structure
  - How formal or informal the language is
  - The use of visuals

QEF project no. 2017/0884

Lesson 4: Reporting Research

Department of English
City University of Hong Kong

Intended learning outcomes

Students should be able to:

- Identify elements of the structure of a scientific report and suggest ways to write each section
- Identify the vocabulary and grammar of scientific report
- Know how to write sections of their own scientific report

Let's take a look at some tips in reading an IMRD article:

https://www.youtube.com/watch?v=wH1MBvhcE8w&list=PLLXoisyJKuDKaHsQ5XPhYGWt9SFWWWX-j&index=1

Task 1: Identifying sections of scientific research article

The structure of a scientific report is likely to contain at least the following five sections:

1. **Introduction**
2. **Methods**
3. **Results**
4. **Discussion**
5. **Conclusion**

- ons of each section's contributions to a Match paragraphs A to E below to its

analysis (分析) *noun*
analyses - plural form

Verb:
analyse - UK spelling
analyze - US spelling

data (數據) noun: information that can be analysed

A e researchers found from ata that they collected. Often, these bles or in various kinds of diagrams.

phenomenon (現象) *noun:*
a general word for anything that exists or happens

phenomena - plural form

Results

ntifies and usually describes the phenomenon that was researched. It also often refers to previous research that has been done on the same or a similar topic and makes it clear why more resear

hypothesis (假設) *noun*
singular form

a states the research question or r as designed to answer or the hypothesis or hypotheses that the research was designed to test. In some research reports, the research questions and hypotheses may be set out in a separate section labelled Aims.

plural form

Introduction

C. This section tells the reader how the research was carried out. In other words, it explains what kinds of data the researcher(s) collected and how they collected it.

Methods

D. This section usually briefly summarizes the most important findings from the research, relates them to the initial research question(s) or hypothesis (hypotheses) and often suggests how the findings could be made use of, i.e. their possible applications. It may also say something about the limitations of the research and give suggestions for further research.

Conclusion

E. This section normally says what the researchers think the results mean and draws attention to anything that seem important, interesting or surprising results. It will also often attempt to explain the results and to compare the results of the research with results from previous research.

Discussion

Task 2: Identifying some commonly used words and phrases

In which sections of a report are the following words most likely to be found?

collected, illustrate, support, little is known about, indicate, was calculated, conclude, was conducted, increased, further research, limitation, show, previous studies, aim to, fell, test have shown that, explore, confirm, recorded, suggest, participants, analysed, recommend

Task 3: Identifying which paragraphs belong to which sections

Order the paragraphs within each section, paying attention to the logic of the text and any clues such as conjunctions or pronouns.

Multitasking: A Study of Gender Differences

A. Second, an experiment involving a task that required use of **visual**, **auditory**, **verbal** and **motor** skills (Experiment B) was conducted. The participants were asked to complete an online word search on the topic "fruits", while at the same time listening to and answering simple single-**digit** maths questions. Searching for the words served as a visual task while clicking on the mouse to select the words was a motor task. The auditory task was listening to the maths questions, and verbally answering the math questions served as the verbal task. Each test lasted 2 minutes, and the scores were totaled by adding up the number of maths questions answered correctly and the number of words found.

Methods

B. To test the **statistical significance** of the difference in the average scores of males and females in Experiment A, an independent sample **t-test** was conducted. The calculated t-value, 2.47, is less than the critical value 12.71 at a 0.05 statistical significance level. The small t-value compared to the critical value indicates that the difference between the males' and the females' ability to multitask is not statistically significant.

Results

C. The findings of this study clearly suggest that, **contrary to** some previous research, there is no statistically significant relationship between the multitasking ability of men and women. However, further research could investigate a range of specific tasks that might show a **gender** difference in certain kinds of multitasking abilities.

Conclusion

D. The term multitasking refers to doing more than one task at the same time, for example talking on the phone while typing an assignment. Multitasking is common in contemporary life, through the ways we think, the ways we communicate, and in the ways we conduct our everyday lives. Various research studies have identified many factors that can affect a person's ability to multitask. Such factors range from pressure coming from a person's environment, such as a coming deadline (Sarmento & Tsai, 2015), to more personal factors such as habits or a natural affinity towards a certain subject (Sanbonmatsu, Strayer, Medeiros-Ward, & Watson, 2013). However, there does not seem to be agreement as to whether gender is related to a person's ability to multitask. On the one hand, there is literature to support the hypothesis that women are better at multitasking than men (Kuptsova, Ivanova, Petrushevskiy, Fedina, & Zhavoronkova, 2016). On the other hand, there is also **literature** that supports the hypothesis that there are no great gender differences when it comes to multitasking (Buser & Peter, 2012). This difference in the research findings is puzzling.

Introduction

E. There are limitations to our study. First, we did not have a lot of information on the personal backgrounds of many of the participants. For example, factors such as whether the participants are frequent game players, or whether their field of study or work assists in their multitasking ability could have influenced their performance. Second, the method of convenience sampling leaves room for sampling bias that could be avoided with the use of random sampling to cover a wider range of the general population in Hong Kong.

Discussion

F. The purpose of this study is to investigate the relationship between gender and the ability to multitask in a sample of Hong Kong participants. Our hypothesis is that there is no statistically significant difference in the multitasking ability between the genders.

Introduction

G. On average, the males scored higher than the females in Experiment A, while the females scored higher on average in Experiment B.

Results

H. Multitasking may involve visual tasks, auditory tasks, verbal tasks or motor tasks, with various levels of difficulty (Ohio State University, 2012). Two separate experiments were designed to test two types of multitasking: visual-visual-motor tasks and visual-auditory-verbal-motor tasks.

Methods

I. First, a visual-visual-motor task-centered experiment (Experiment A) was conducted to test the visual-visual multitasking ability of the participants. As each level of difficulty increased, additional mini-games were added to the screen to be played simultaneously, with two or more games being controlled by each hand. Each participant was asked to play the games three times. All of the final scores in the games were recorded.

Methods

J. The findings support our initial hypothesis that there is no statistically significant relationship between the multitasking ability of men and women. It challenges the findings of previous research which suggested that women are better at multitasking than men (Stoet, O'Connor, Conner, & Laws, 2013; Kuptsova, Ivanova, Petrushevskiy, Fedina, & Zhavoronkova, 2016) and confirms research that found no statistically significant difference between the performance of the two genders (Buser & Peter, 2012).

Discussion

K. The **average** score of all the participants on their first try in Experiment A was 42.876. Their average score increased to 46.777 on their second try and continued to rise to 51.185 on their third try. This rise in the scores as more tries were completed can be seen in both genders. This suggests that the participants were able to achieve higher scores with more practice.

Results

L. An independent sample t-test was also conducted test the statistical significance of the difference in the average scores of males and females in Experiment B. The calculated t-value, 2.01, is less than the critical value 12.71 at a 0.05 statistical significance level. The small t-value compared to the critical value indicates that the difference between the males' and females' ability to multitask is not statistically significant.

Results

M. The increase in the participants' performance in Experiment A as more tries were completed seems to indicate that with more practice, the multitasking ability of an individual can improve, regardless of gender. Other research similarly suggests that multitasking ability can be improved though training (Dux, Tombu, Harrison, Rogers, Tong, & Marois, 2009).

Discussion

N. In Experiment B (visual-auditory-verbal-motor task), the average scores for males and females were 22.35 and 23.47 respectively, while the **median** score for males and females were 22 and 22.5 respectively. The scores of males ranged from 16 to 28, while the scores of females ranged from 16 to 29.

Results

O. In Experiment A (visual-visual-motor), the average scores for males and females were 53.3 and 43.4 respectively, while the median scores for males and females were 50.15 and 41.7 respectively. The differences in the scores among individuals, regardless of gender, varied hugely, ranging from approximately 20 to 90. The scores of males ranged from 22.7 to 90.3 in Experiment A, while the scores for females ranged from 22 to 91.3, as shown in Figure 1.

Results

Multitasking: A Study of Gender Differences

- Introduction: **D, F**
- Methods: **A, H, I**
- Results: **B, G, K, L, N, O**
- Discussion: **E, J, M**
- Conclusion: **C**

Multitasking: A Study of Gender Differences

Introduction (1)

(D)The term multitasking refers to doing more than one task at the same time, for example talking on the phone while typing an assignment. Multitasking is common in contemporary life, through the ways we think, the ways we communicate, and in the ways we conduct our everyday lives. Various research studies have identified many factors that can affect a person's ability to multitask. Such factors range from pressure coming from a person's environment, such as a coming deadline (Sarmento & Tsai, 2015), to more personal factors such as habits or a natural affinity towards a certain subject (Sanbonmatsu, Strayer, Medeiros-Ward, & Watson, 2013). However, there does not seem to be agreement as to whether gender is related to a person's ability to multitask. On the one hand, there is literature to support the hypothesis that women are better at multitasking than men (Kuptsova, Ivanova, Petrushevskiy, Fedina, & Zhavoronkova, 2016). On the other hand, there is also literature that supports the hypothesis that there are no great gender differences when it comes to multitasking (Buser & Peter, 2012). This difference in the research findings is puzzling.

Multitasking: A Study of Gender Differences

Introduction (2)

(F) The purpose of this study is to investigate the relationship between gender and the ability to multitask in a sample of Hong Kong participants. Our hypothesis is that there is no statistically significant difference in the multitasking ability between the genders.

Multitasking: A Study of Gender Differences

Methods

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(H) Multitasking may involve visual tasks, auditory tasks, verbal tasks or motor tasks, with various levels of difficulty (Ohio State University, 2012). Two separate experiments were designed to test two types of multitasking: visual-visual-motor tasks and visual-auditory-verbal-motor tasks.

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Multitasking: A Study of Gender Differences

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Multitasking: A Study of Gender Differences

Results (2)

(K) The average score of all the participants on their first try in Experiment A was 42.876. Their average score increased to 46.777 on their second try and continued to rise to 51.185 on their third try. This rise in the scores as more tries were completed can be seen in both genders. This suggests that the participants were able to achieve higher scores with more practice.

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Multitasking: A Study of Gender Differences

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Multitasking: A Study of Gender Differences

Conclusion

(C) The findings of this study clearly suggest that, contrary to some previous research, there is no statistically significant relationship between the multitasking ability of men and women. However, further research could investigate a range of specific tasks that might show a gender difference in certain kinds of multitasking abilities.

Review

- Structure of a scientific report?
  - Introduction
  - Methods
  - Results
  - Discussion
  - Conclusion
- How should each section of a scientific report be written ?

See you in the next lesson!

We will learn…

– The elements of the introduction section

Lesson 5: Exploring Introductions

Department of English
City University of Hong Kong

QEF project no. 2017/0884

Intended learning outcomes

You will learn…

- The six elements in introduction sections
- Features such as grammar used in introductions
- How to evaluate the reliability of information

QEF project no. 2017/0884

TASK 1: Exploring how introductions are organised (Text 1)

Read through ***text one*** and find where in the text are the following pieces of information are located?

i. The ***purpose(s)*** of the research reported in this article.
ii. The ***general area or general issue*** that the research reported in this article is concerned with.
iii. The ***more specific problem or issue*** focused on in the research.
iv. What ***research*** has already been ***done on the topic***?
v. ***Supporting information*** relating to the general area or general issue that the research is concerned with.
vi. ***Supporting information*** about the more specific problem that the research is concerned with.

QEF project no. 2017/0884

TEXT ONE

A Study of Waste Disposal at a Hong Kong University

Introduction

In Hong Kong, **disposal** of waste is a major issue. According to statistics from the Hong Kong Environmental Protection Department (2019), the average daily quantity of **municipal** solid waste in 2017 amounted to more than 15,000 tonnes, coming from **domestic**, commercial and industrial sources.

Excessive production of waste is leading to the filling up of all available landfill sites. Robson (2017) estimates that Hong Kong's **landfill sites** will become full by 2020 and will no longer be able to accept additional waste. In addition, some types of waste, especially those produced by the construction and chemical industries, are **non-biodegradable** and may release toxic materials into the environment, creating air pollution in the surrounding area. This can result in an increasing risk of **respiratory** disease.

Previous scientific reports have focused mainly on collecting quantitative data on the volume of waste generated by different sectors in Hong Kong. Our report will focus on investigating the extent of the waste disposal problem at one institution, the City University of Hong Kong, and on **probing** the perceptions that students of the university have of the problem and of possible ways to tackle it.

TEXT ONE

A Study of Waste Disposal at a Hong Kong University

Introduction

general area/issue

supporting information

(1) In Hong Kong, **disposal** of waste is a major issue. (2) According to statistics from the Hong Kong Environmental Protection Department (2019), the average daily quantity of **municipal** solid waste in 2017 amounted to more than 15,000 tonnes, coming from **domestic**, commercial and industrial sources.

more specific problem/issue

supporting information

(3) Exc waste is leading to the filling up of all available landfill sites. (4) Robson (2017) estimates that Hong Kong's **landfill sites** will become full by 2020 and will no longer be able to accept additional waste. In addition, some types of waste, especially those produced by the construction and chemical industries, are **non-biodegradable** and may release toxic materials into the environment, creating air pollution in the surrounding area. This can result in an increasing risk of **respiratory** disease.

previous research on the topic

purpose(s) of the present research

(5) Previous scientific reports have focused mainly on collecting qua the volume of waste generated by different sectors in Hong Kong. (6) Our report will focus on investigating the extent of the waste disposal problem at one institution, the City University of Hong Kong, and on **probing** the perceptions that students of the university have of the problem and of possible ways to tackle it.

TASK 1: Exploring how introductions are organised (Text 2)

Read through text 2 and discuss the following questions

i. Can you find the same ***six elements*** ***(question 1 above***) in this text?
ii. Are there ***more or fewer elements***?
iii. Are there ***any differences in the way*** the elements are ***sequenced***?
iv. Text 2 is longer than text 1. Which of the elements is ***expanded most***?

QEF project no. 2017/0884

TEXT TWO

Texting can wait!

Introduction

As technology has improved, the multifunctional mobile phone has become an essential part of many Hong Kong people's lives. They use mobile phones to connect with each other by texting, calling and using social media applications. However, although mobile phones give a lot of convenience to users, they can affect user reaction times, which can lead to dangerous situations.

According to Reed & Robbins (2008) texting increases a person's visual and **cognitive load**. Having a conversation on a mobile phone may also increase cognitive load and can narrow the user's **visual scan** (Richtel, 2010). Therefore, while using mobile phones, users may be less able to respond quickly and appropriately to sudden events.

Several studies have shown that using smartphones when driving can increase the chance of having an incident. A report by the Government of China indicated that in 2014, 47.2% of road incidents in China were related to the use of mobile phones when driving. Pedestrians using mobile phones can also be at risk. Jehle (2015) reported that users often cannot control complex actions such as walking when they are texting on a mobile phone (Zebra, 2015). Other research has also found that pedestrians using mobile phones have reduced awareness and **distracted attention** (Hatfield and Murphy, 2007, Hyman et al., 2010). A statistical analysis conducted at Ohio State University (Richtel, 2010) indicated that from 2006 to 2008 four times more pedestrians visited a hospital emergency room due to phone-related accidents than due to other factors.

Although many studies such as those cited above have been done on the effects of using mobile phones while driving or walking, little information is available on the effect of using a mobile phone on the reaction time of the user in general. Therefore, research in this area is needed.

The purpose of this report is to explore and analyze the **impact** of mobile phones on user reaction time and to discover whether texting or calling has the greater impact on **reaction time.**

TEXT TWO

Texting can wait!

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As technology has improved, the multifunctional mobile phone has become an essential part of many Hong Kong people's lives. They use mobile phones to connect with each other by texting, calling and using social media applications. However, although mobile phones give a lot of convenience to users, they can affect user reaction times, which can lead to dangerous situations.

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supporting information

general area/issue

more specific problem/issue

supporting information

previous research on the topic & gap

purpose(s) of the present research

TASK 2: Exploring Grammar (Text 1)

1. Identify the ***finite verbs*** and their ***subjects***;
2. Identify the ***tenses*** the ***finite verbs*** are in;
3. Identify the ***non-finite verbs***;
4. Identify ***modal auxiliaries*** (modal verbs).

TEXT ONE

A Study of W… University

Introduction

Finite Verb:
a verb that is marked for tense and sometimes for number/person, and usually has a subject

In Hong Kon… Hong Kong… **municipal** … From **domestic**, commercial and…

more formal, more scientific sounding, more concise

preposition

Excessive production of waste is leading to the filling up of all a… sites. Robson (2017) estimates that Hong Kong's **landfill sites** will become full by 2020 and will no longer be able to accept additional waste. In addition, some types of waste, especially those produced by the construction and chemical industries, are **non-biodegradable** and may release toxic materials into the environment, creating air pollution in the surrounding area. This can result in an increasing risk of **respiratory** disease.

modal auxiliary/verb

Previous scientific reports have focused mainly on collecting quantitative data on the volume of waste generated by different sectors in Hong Kong. Our report will focus on investigating the extent of the waste disposal problem at one institution, the City University of Hong Kong, and on **probing** the perceptions that students of the university have of the problem and of possible ways to tackle it.

TASK 2: Exploring Grammar (Text 2)

1. Identify the ***ways of reporting*** other people's statements;
2. Identify the ***reporting verbs*** and the ***tenses*** they are in;
3. Identify the ***degrees of possibility*** suggested by the reporting verbs.

TEXT TWO

Texting can wait!

Introduction

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Although many studies such as those cited above have been done on the effects of using mobile phones while driving or walking, little information is available on the effect of using a mobile phone on the reaction time of the user in general. Therefore, research in this area is needed.

The purpose of this report is to explore and analyze the **impact** of mobile phones on user reaction time and to discover whether texting or calling has the greater impact on **reaction time.**

no doubt

no doubt

no doubt

possible doubt

more doubt:

- claim that
- argue that
- suggest that
- hypothesise that

Task 3: Exploring the use of different reporting verbs

You came across an article by a scholar surnamed Wong.
In his article, Wong writes that:

A major problem for writers of scientific texts is selecting appropriate reporting verbs when citing the work of others.

There are 3 possible ways to present his idea as a recognized fact in your own report.

1. Repeat in your own words and cite his study:

A problem that many writers of scientific texts face is selecting appropriate reporting verbs when they want cite the work of others (Wong, 2020).

2. You can use phrases such as "according to…" to indicate you may or may not completely agree with Wong:

According to Wong (2020), selecting appropriate reporting verbs when citing the work of others is a major problem for writers of scientific texts.

3. If you want to signal it is additional information, or that Wong's idea does not apply in all contexts, you can begin with:

Wong (2020) says/claims/found (or any other reporting verb) that …

All of the reporting verbs listed below could be used in the above sentence, depending on what you want to signal about your attitude to what Wong says.

- argues
- found
- concluded
- states
- suggests
- hypothesizes
- points out
- claims

	Verb used	What the writer could be trying to signal
argues		Wong presents this as a fact, but at this stage I am not signalling whether I believe it or not.
suggests		Wong puts this idea forward and presents his reasons. At this stage I am not signalling whether I accept his view or not.
points out		This is a result that comes from research that Wong did. I have no reason NOT to believe it.
hypothesizes		Wong says that this could be true. At this stage I am not signalling what I think.
claims		Wong presents this as a relevant fact but does not say much more about it. It is probably something that should be obvious or is already well known.
concluded		This is what Wong thinks his research shows or means. I have no reason NOT to believe him.
found		Wong presents this as a fact. Other scholars do not agree and he may or may not be correct.
states		Wong presents this as an idea that may or not be true, and needs to be researched.

Task 4: Finding relevant information and the reliability of information

Suppose you are writing an introduction to a report into research about healthy diets (your **diet** is what you usually eat). You have googled "healthy diet" and found the following.

Ad. https://www.noom.com A. Diet Meal Plans – Get Healthy Again with Noom
https://www.who.int/news-room/fact-sheets/detail/healthy-diet B. Healthy diet - WHO | World Health Organization
https://en.wikipedia.org/wiki/Healthy_diet C. Healthy Diet - Wikipedia
https://pubmed.ncbi.nlm.nih.gov/32012681/ D. Defining a Healthy Diet: Evidence for The Role of Contemporary Dietary Patterns in Health and Disease
https://www.nutrition.org.uk/healthyliving/healthydiet/healthybalanceddiet.html E. A Healthy, Balanced diet – British Nutrition Foundation

Consider the following points when evaluating the reliability of information :

- The aim and purpose of the text.
- The language features, including vocabulary and sentence structure.
- Any references to academics, healthcare providers or previous data?
- Level of formality and the writer's tone in the text

Citation and referencing

- When do you use an in-text citation?
- What does an in-text citation look like?
- When must you include a reference to a source in the reference list? Why?

Let's watch this video to get to know more about citations and referencing:

https://www.youtube.com/watch?v=eulzc62wgOg&list=PLLXoisyJKuDKaHsQ5XPhYGWt9SFWWWX-j&index=6

APA in-text citation technique

An experiment was designed for the participants to generate ideas in response to a specific task (Malaga, 2000).

Malaga (2000) designed an experiment for the participants to generate ideas in response to a specific task.

This is a non-integral citation: the author is NOT integrated in the sentence

APA uses author-date format: the author's last name, comma, date

If the author is part of the sentence, you only need to put the year in brackets

This is an integral citation: the author is integrated in the sentence

Review

- Six elements of the Introduction section
- Finite/modal/reporting verbs
- Integral and non-integral citation

See you in the next lesson!

Lesson 6: Drafting your introduction

Department of English
City University of Hong Kong

Intended learning outcomes

Students should be able to:

- Report introductions in order
- Understand what information to use in reporting on group projects
- Able to identify the language features used in writing reports
- Write the introduction sections of their own reports

Let's recap last week's content on how to write the Introduction section:

https://www.youtube.com/watch?v=QPJPH-ruFC8&list=PLLXoisyJKuDKaHsQ5XPhYGWt9SFWWWX-j&index=2

TASK 1: Exploring Organisation (Text 1)

1. Remember the report "A Study of Waste Disposal at a Hong Kong University" that you read last week?

   I. What **problems** did the report talk about?

   II. Where was the research carried out?

   III.What did the researchers try to find out?

Below are the notes for the introduction to the report "A Study of Waste Disposal at a Hong Kong University" you read last week.

- Try to **reorder** these notes as a preparation for writing the introduction
- Note that arrows indicate one thing leads to or is the cause of another thing

A Study of Waste Disposal at a Hong Kong University (**Notes for the introduction)**
(Note 1) some types of waste (esp. by construction & chem. industries) = non-biodegradable - may release toxic materials into environment ⇩ air pollution in surrounding area
(Note 2) average daily quantity of municipal solid waste 2017 = 15,000 tonnes (Hong Kong Environmental Protection Department 2019)

(note 3)

excessive production of waste

⇩

landfill sites filling up - full by 2020 then no longer able to accept more waste
(Robson 2017 estimates)

(note 4)

Previous scientific reports: mainly collected quantitative data on how much waste generated by different sectors in Hong Kong.

(note 5)

In HK disposal of waste = major issue

(note 6)

Our report:

(i) How big a problem is waste disposal at CityU?

(ii) What are students' perceptions of problems and ways to tackle?

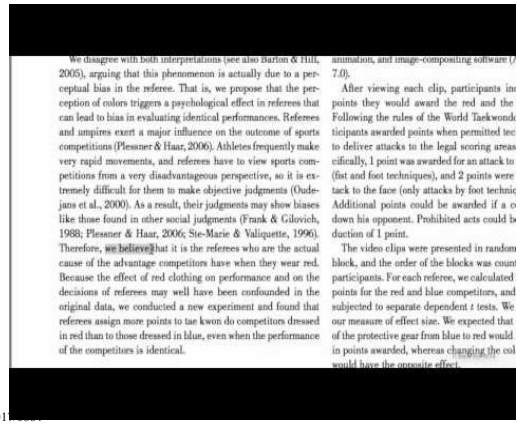
2. When you are satisfied that you have arranged the notes in the most logical order, try writing the introduction by looking at the notes. As you do so, pay careful attention to the language features you looked at last week. For example:

- tense,
- finite and non-finite verbs,
- verb forms following modal auxiliaries,
- nominalization,
- ways of reporting the finding of previous studies

Think about…

- Does each of your sentences have at least one **finite** verb?
- Is each finite verb in the correct tense?
- Do you use the correct verb forms after modal verbs?
- Do you use the right reporting verbs?

Let's learn about the language features used in the introduction!



We disagree with both interpretations (see also Barlow & Hill, 2005), arguing that this phenomenon is actually due to a perceptual bias in the referee. That is, we propose that the perception of colors triggers a psychological effect in referees that can lead to bias in evaluating identical performances. Referees and umpires exert a major influence on the outcome of sports competitions (Plessner & Haar, 2006). Athletes frequently make very rapid movements, and referees have to view sports competitions from a very disadvantageous perspective, so it is extremely difficult for them to make objective judgments (Oudejans et al., 2000). As a result, their judgments may show biases like those found in other social judgments (Frank & Gilovich, 1988; Plessner & Haar, 2006; Ste-Marie & Valiquette, 1996). Therefore, we believe that it is the referees who are the actual cause of the advantage competitors have when they wear red. Because the effect of red clothing on performance and on the decisions of referees may well have been confounded in the original data, we conducted a new experiment and found that referees assign more points to tae kwon do competitors dressed in red than to those dressed in blue, even when the performance of the competitors is identical.

animation, and image-compositing software (
7.0).

After viewing each clip, participants in
points they would award the red and the
Following the rules of the World Taekwondo
ticipants awarded points when permitted tec
to deliver attacks to the legal scoring areas
cifically, 1 point was awarded for an attack to
(fist and foot techniques), and 2 points were
tack to the face (only attacks by foot technic
Additional points could be awarded if a c
down his opponent. Prohibited acts could b
duction of 1 point.

The video clips were presented in random
block, and the order of the blocks was count
participants. For each referee, we calculated
points for the red and blue competitors, and
subjected to separate dependent *t* tests. We
our measure of effect size. We expected that
of the protective gear from blue to red would
in points awarded, whereas changing the col
would have the opposite effect.

3. When you have finished writing the introduction, **exchange your text with two of your classmates**. Notice any differences between your introduction and the introductions written by your classmates. Is there anything in your introduction that you think you should change? Is there anything in your classmates' texts that you think they ought to change?

4. **Look at the original text of the** introduction that your teacher will show you. Notice the **differences** between your version and the original. Is there **anything** in your introduction that you think you should change?

(Original text)

TASK 1: Suggested Answer

Second Paragraph

Excessive production of waste is leading to the filling up of all available landfill sites. Robson (2017) estimates that Hong Kong's landfill sites will become full by 2020 and will no longer be able to accept additional waste. In addition, some types of waste, especially those produced by the construction and chemical industries, are non-biodegradable and may release toxic materials into the environment, creating air pollution in the surrounding area. This can result in an increasing risk of respiratory disease.

The Entire Introduction

A Study of Waste Disposal at a Hong Kong University

Introduction

In Hong Kong, disposal of waste is a major issue. According to statistics from the Hong Kong Environmental Protection Department (2019), the average daily quantity of municipal solid waste in 2017 amounted to more than 15,000 tonnes, coming from domestic, commercial and industrial sources.

Excessive production of waste is leading to the filling up of all available landfill sites. Robson (2017) estimates that Hong Kong's landfill sites will become full by 2020 and will no longer be able to accept additional waste. In addition, some types of waste, especially those produced by the construction and chemical industries, are non-biodegradable and may release toxic materials into the environment, creating air pollution in the surrounding area. This can result in an increasing risk of respiratory disease.

Previous scientific reports have focused mainly on collecting quantitative data on the volume of waste generated by different sectors in Hong Kong. Our report will focus on investigating the extent of the waste disposal problem at one institution, the City University of Hong Kong, and on probing the perceptions that students of the university have of the problem and of possible ways to tackle it.

Task 2 : Writing introductions from notes (Text 2)

1. Below is a version of the second text you read last week. This first paragraph and the last two paragraphs have been completed but the two other paragraphs are still in note form. Try writing the incomplete paragraphs from the notes. Pay particular attention to the use of reporting verbs.

1. Compare your versions of the paragraphs with your classmates and the originals. Make any changes you think are necessary.

Task 2 : Writing introductions from notes (Text 2)

Texting can wait!

Introduction

As technology has improved, the multifunctional mobile phone has become an essential part of many Hong Kong people's lives. They use mobile phones to connect with each other by texting, calling and using social media applications. However, although mobile phones are very useful, when people use them, their reaction times may be affected. This can lead to dangerous situations.

(paragraph 2)
Reed & Robinson 2008: texting increases visual + cognitive load

Richtel 2010: conversation on mobile phone - increase cognitive load + narrow visual scan

Therefore: using mobile phones - perhaps less able to respond quickly and appropriately to sudden events

(notes for paragraph 3)
Several studies: using smartphone when driving can increase chance of accident

China Gov. Report: in 2014 47.2% of road accidents in China related to use of mobile phones when driving

Pedestrians using mobile phones also at risk

Jehle 2010: users cannot control complex actions e.g. walking when texting on mobile phone

Hatfield & Murphy 2007, Hyman et al 2010: pedestrians using phones - reduced awareness + distracted attention

Richtel 2010 (statistical analysis at Ohio Uni.): from 2006 - 2008 x4 pedestrians visited hospital emergency room due to phone-related accidents than due to other factors

Although many studies such as those cited above have been done on the effects of using mobile phones while driving or walking, little information is available on the effect of using a mobile phone on the reaction time of the user in general. Therefore, research in this area is needed.

The purpose of this report is to explore and analyze the impact of mobile phones on user reaction time and to discover whether texting or calling has the greater impact on reaction time.

Task 2 : Suggested Answers

Introduction

As technology has improved, the multifunctional mobile phone has become an essential part of many Hong Kong people's lives. They use mobile phones to connect with each other by texting, calling and using social media applications. However, although mobile phones give a lot of convenience to users, they can affect user reaction times, which can lead to dangerous situations.

According to Reed & Robbins (2008) texting increases a person's visual and cognitive load. Having a conversation on a mobile phone may also increase cognitive load and can narrow the user's visual scan (Richtel, 2010). Therefore, while using mobile phones, users may be less able to respond quickly and appropriately to sudden events.

Task 2 : Writing introductions from notes (Text 2)

Several studies have shown that using smartphones when driving can increase the chance of having an incident. A report by the Government of China indicated that in 2014, 47.2% of road incidents in China were related to the use of mobile phones when driving. Pedestrians using mobile phones can also be at risk. Jehle (2015) reported that users often cannot control complex actions such as walking when they are texting on a mobile phone. Other research has also found that pedestrians using mobile phones have reduced awareness and distracted attention. (Hatfield and Murphy, 2007, Hyman et al., 2010). A statistical analysis conducted at Ohio State University (Richtel, 2010) indicated that from 2006 to 2008 four times more pedestrians visited a hospital emergency room due to phone-related accidents than due to other factors.

Although many studies such as those cited above have been done on the effects of using mobile phones while driving or walking, little information is available on the effect of using a mobile phone on the reaction time of the user in general. Therefore, research in this area is needed.

The purpose of this report is to explore and analyze the impact of mobile phones on user reaction time and to discover whether texting or calling has the greater impact on reaction time.

Review

- Information to use in reporting on group projects
- Turning notes into paragraphs
- Language features used in writing introductions.

See you in the next lesson!

Lesson 7&8: Methods
Explaining how the research was carried out

Department of English
City University of Hong Kong

Intended learning outcomes

You will learn…

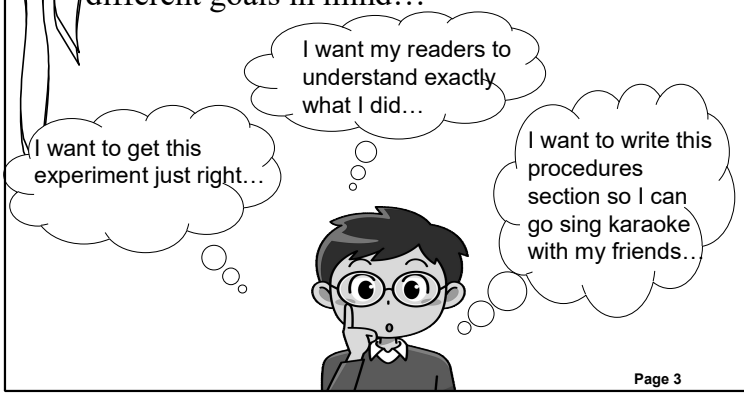
- How to analyze the data you got
- How to evaluate the validity of the results you report
- Explain the set of instructions followed for the research

Page 1

Scientific report - Methods

Page 2

- Different writers approach methods with different goals in mind…



Page 3

Purposes of methods sections

Why do we need the method section in a report?

This section should be written in a **clear** and **concise manner**, but should always **present enough information**:

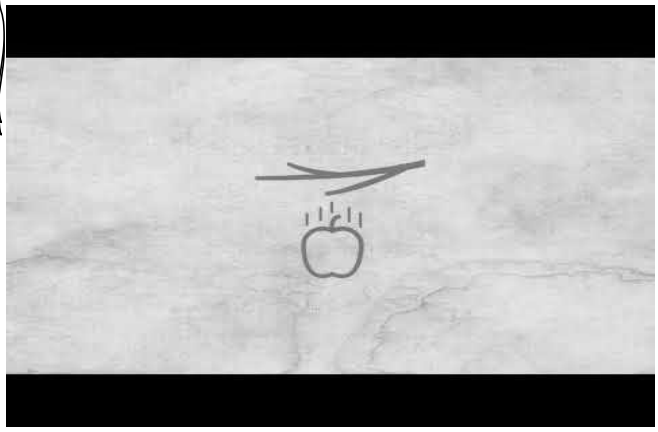
To show the research process

To give enough information so that the readers can interpret your results

To give enough information so that the readers can copy your work

Page 4

Functions in methods sections



https://www.youtube.com/watch?v=eaoF_58hyO4

Page 5

Functions in methods sections

- Describing procedures:
  - Describing the way you collect the data;
  - Describing the way you experimented;
  - Describing the way you analyze the data.
- Explaining procedures:
  - Why did you use such methods?

Page 6

Remember!

★ It should not be a step-by-step tutorial but should be an **arranged** and **complete explanation of what was done**;

★ So that the readers can judge the **accuracy of the results** and **conclusions** showed.

★ It is important to show valid results so readers can use them in their own work

Page 7

What does valid results mean?

a) Results that are valuable and will have many useful applications
b) Results that show that the initial hypothesis was correct
c) Results that are worth trying to confirm by doing further research
d) Results that are reliable because they are based on good evidence or reasons

Page 8

- The word research can be used as a noun or verb
- When used as noun, we simply say "we do research"
- Can you suggest what verbs are often used in front of the noun research?
  - Carry out a research
  - Conduct a research

Page 9

TASK 1: Sequencing sentences from a methods section (Text 1)

1. Text one below is a list of six sentences that come from the methods section of a research report on waste disposal at a Hong Kong university. The sentences are out of order. Arrange them according to what seems to be the most logical order. Note also that the original text had two paragraphs. Where could the paragraph break be?

Page 10

TEXT ONE

Methods

a. In order to find out how **aware** students are of the waste problem at the university, 10 students chosen **at random** were interviewed.
b. The bins were checked from time to time and the total volume of rubbish inside them was measured and **recorded**.
c. Bin 1 was at the entrance to the canteen, bin 2 was near the lift on the ground floor and bin 3 was near the exit to the university concourse.
d. Each of the students was asked to answer questions and the interviews were audio-recorded for the later analysis.
e. The **capacity** of each bin was recorded by using a tape measure.
f. In order to estimate the amount of waste produced every day by students at the university, three bins at different **locations** within one academic building (AC1) were selected.

Page 11

2. When you have arranged the sentences in the most logical order, compare your arrangement of the sentences with the original text that your teacher will show you. Are there any differences? If so, do they matter?

Page 12

3. Read through the text again. Are there any places in the text where you think extra information should be added? What kind of information?

Page 13

4. Find the sentence in which the writer uses the verb *estimate*. How would the meaning be different if the writer had used the verbs *find* or *discover* instead of *estimate*?

Page 14

5. All the verbs in this section are in past tense except one. Which one? Why is this verb not in past tense? Would it be possible to use past tense? What difference would it make?

Page 15

6. All the clauses in the text that describe what the researchers did use passive voice verb forms. For example:

three bins (…) <u>*were selected*</u>
the capacity […] <u>*was measured*</u>
10 students […] <u>*were interviewed*</u>

Page 16

- Try changing these passive voice clauses into active voice clauses. Make sure they are still in past tense.
- Would it be possible to use active voice everywhere in this text where passive voice is used?
- Is there any difference between using active voice and passive voice in this context?
- Do you think you will use active voice or passive voice in the methods section of your report?

Page 17

TASK 2: From instructions to methods (Text 2)

1. Text Two below is a set of instructions for doing research into the effect of chewing gum on **concentration.** Imagine that you have done this research and are now writing a research report on it. Use the instructions below as the basis for writing the methods section of your report. Write the methods using the personal, less formal style.

Hint: Begin with *We recruited …*

Page 18

TEXT TWO

Chewing Gum and Concentration

1. Find 8 male **subjects** of roughly the same age and divide them into two groups.
2. Ask the 4 members of the first group to play the memory game at https://www.webgamesonline.com/memory/index.php 5 times.
3. Record how long it takes each subject to complete each game.
4. Give the 4 members of the second group some chewing gum and ask them to play the same memory game 5 times while chewing the gum.
5. Record how long it takes members of this group to complete each game.
6. Analyse the results. Did chewing gum increase the subjects' speed and **accuracy** in the memory game?
7. Now repeat the **procedure** with 8 female subjects of roughly the same age.
8. Analyse the results. Did the gender of the subjects make any difference to their speed and accuracy in the game?

Page 19

2. Now rewrite the methods section you just wrote using the less personal, more formal scientific style.

3. List all the steps that you went through in doing your own research and that you will need to include in your methods section. Compare your list with those of your classmates who did the same research.

Page 20

Review

- The purpose of methods sections:

✔**To present the experimental design**

✔**To provide enough detail to allow the reader to interpret your results**

✔**To provide enough detail to allow readers to replicate your work**

Page 21

Lesson 9&10: Results
Presenting and Describing Results

Department of English
City University of Hong Kong

QEF project no. 2017/0884

Intended learning outcomes

You will learn…

- Ways of displaying and describing results
- Draw attention to important findings

 QEF project no. 2017/0884

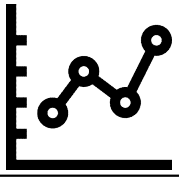
https://www.youtube.com/watch?v=pBp9FYQge2I

QEF project no. 2017/0884

Approaches to results

Why do we need the **Results** section in a report?

- ❑ To clearly and concisely state the findings/results of the experiment



 QEF project no. 2017/0884

Functions in results sections

https://www.youtube.com/watch?v=wZhkXkzZy3Y QEF project no. 2017/0884

'Results' or 'Results and Discussion'?

- **Results**:
  - ➢ States the findings
- **Results and Discussion:**
  - ➢ States and interprets the findings by referring to previous theory and considering possible applications of the research

QEF project no. 2017/0884

Remember!

- The results section shows what data were collected.
- Reports of statistical analyses may appear either in the text or in the relevant Tables or Figures.
- Should be organized around a sequence of Tables and/or Figures to show your key findings in a logical order.
- Important negative results should be reported as well.

Task 1: Describing trends

A. Here is a line graph showing trends in the growth **rate** of Hong Kong's population. Take a look at it and answer the questions.

1. The **horizontal axis** show shows the years. Can you explain what the vertical axis shows?

2. During which year did the growth rate **decline** most?

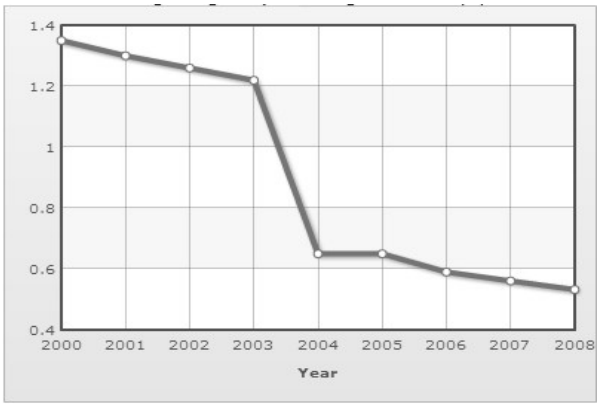


Fig. 1. Hong Kong population growth rate

i. What is the verb related to the noun **growth**? Try re-phrasing **Hong Kong's population growth rate 2000 – 2008** into everyday spoken English. You can begin "How [Adjective] the population of Hong Kong …."

ii. Which of the following is closest in meaning to the verb **decline**?

a) decrease
b) increase
c) change
d) improve

iii. Here are some other verbs that can be used to describe trends. Check that you know what they all mean, how to use them in the past tense and how to change them into nouns.

VERB	PAST TENSE	NOUN
increase	increased	increase
decrease		
change		
shrink		
expand		
drop		
fall		
rise		
climb		
fluctuate		

Note: These verbs are normally in the active voice when used to describe trends. For example:

The population increased rapidly throughout the 1960's.

NOT

The population was increased rapidly throughout the 1960's.

B. Here is a description of the above line graph.

Fig. 1 shows the Hong Kong population growth rate from 2000 to 2008. The growth rate declined **considerably** over this period, with a **marked** drop from 1.2% to 0.6% in 2003 to 2004.

- i. Which verb is in the present tense? Why?
- ii. Which verb is in the past tense? Why?

iii. Which of the following phrases are closest to the meaning of **considerably** as used in this text.

a) by a huge amount
b) by a small amount
c) by quite a lot
d) by hardly at all

iv. Here are some other adverbs that can describe upward or downward movement. Which of them say something about the speed of change, and which of them say something about the amount of change?

slightly, gradually, steadily, rapidly, sharply, hugely, steeply, suddenly, significantly

vi. Which of the following phrases are closest to the meaning of **marked** as used in this text.

a. shown clearly in the diagram
b. surprising and hard to explain
c. obvious and easily noticed
b. rapid and steep

vii. Look back at the list of adverbs given in iv above. How do you change them into adjectives? Which of the adjectives could be used before a noun like "drop"?

C. Now try writing your own descriptions of the results displayed in the following line graph.

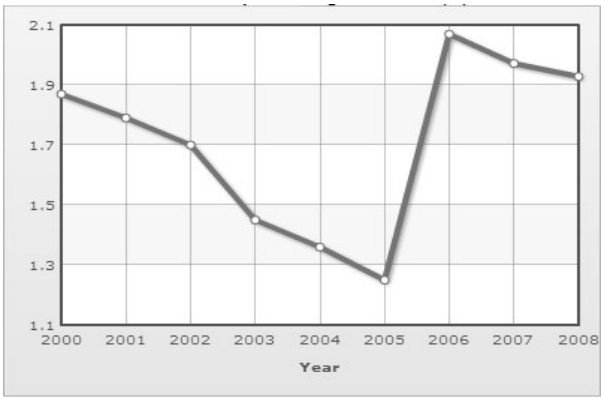
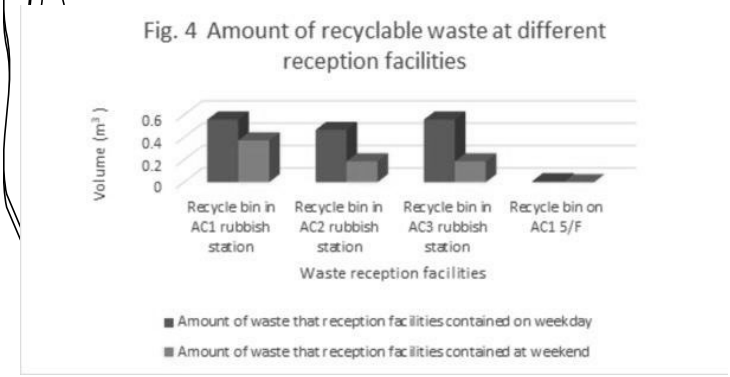


Fig. 2. Ghana's population growth rate

Task 2: Comparing Results

Fig. 4 Amount of recyclable waste at different reception facilities



1. What does the vertical axis show?
2. What is the unit of measurement in the vertical axis?
3. What does the horizontal axis show?
4. Why are two different colours used?
5. What do you think are the most interesting findings displayed in this graph?

i. Can you explain in everyday words what "recyclable waste" is? How many other words can you think of that are formed from a verb + able?

ii. What verb is related to the noun "reception"? Can you explain in everyday words what a "waste reception facility" is?

[Possible Answer: "A place where …."

B. The following text is a description of the results displayed in the bar graph above.

Fig. 4 shows the volume of recyclable waste at different waste reception facilities on a weekday and at the weekend. The bin at the AC1 rubbish station contained the highest overall volume of recyclable waste, followed by the AC3 station bin and the AC2 station bin. In the bins at both the AC1 station and the AC3 station, the volume reached just over 0.6 m^3 on the weekday. The recycling bin on AC1 5/F contained the lowest amount of recyclable waste, less than 0.1 m^3. The graph also indicates that at all the stations the volume of recyclable waste disposed of on the weekday was higher than at the weekend.

a. The description begins with the words "Fig.4 shows …" What other phrase in the text means almost the same as this?

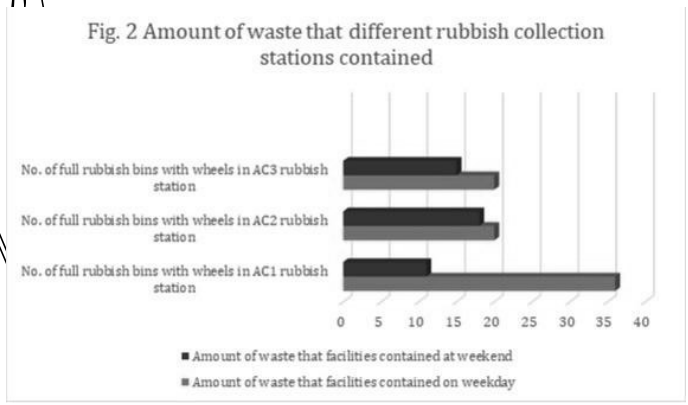
b. Can you explain why these two different prepositions are used?

How about: at the ACI rubbish station / on the weekday / in the bins / at the weekend"?

iii. Why do the adjectives "high" and "low" in the text sometimes end in *-est* and sometimes end in *-er?*

iv. Suppose that you found an equal volume of recyclable waste in the bins on the weekday and at the weekend, how would you rewrite the final sentence to express this? Begin: "The graph also indicates that at all the stations the volume of recyclable waste disposed of on the weekday was ……"

B. Now trying writing a description of the results displayed in the following bar graph.



Review

The purpose of results sections:

- To clearly and concisely describe the results of the experiment

Lesson 11&12
Discussions and Conclusions

Department of English
City University of Hong Kong

QEF project no. 2017/0884

Discussion

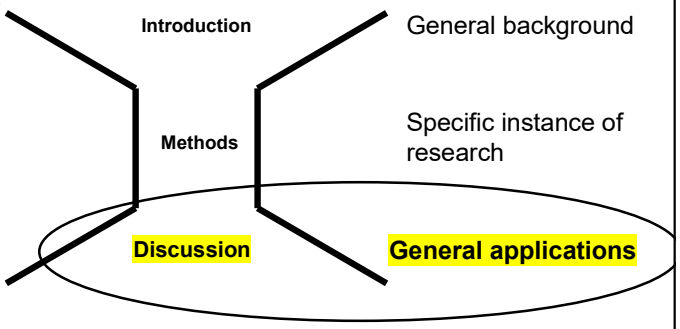
Communicative purposes of the discussion

To understand the findings in terms of the scientific concepts explored in the experiment

To notice any unusual findings / differences from results

To examine for sources of uncertainty/experimental mistake, suggest improvements in the experiment

Information structure: specific to general



https://www.youtube.com/watch?v=eDKIJ7zx_uw

What does a Discussion includes?

- Highlighting important and interesting findings
- Acknowledging unusual findings or difference from expected results
- Interpreting findings by comparing with previous researches

Conclusion

Communicative purpose of conclusion

To succinctly state the main findings and (if appropriate) implications

What does a Conclusion includes?

- The "takeaway" of the research
- Summary of the findings and relate to the hypothesis
- Implications of findings
- Recommendations
- Limitations

Task 1: Examining sample Discussions and Conclusions

Text One

Discussion

As the data from the interviews show, people rely on mobile phones for many purposes, and they believe that they need to use them in public areas in order both to keep up with their work when they are away from their workplaces, and to keep in contact with their friends and family. This may be why people continue to use their mobile phones in public areas even though they are aware that when they are looking at their phones, or talking on their phones, they may react more slowly to unexpected events.

It is notable that about half the interviewees thought that they could multitask effectively using mobile phones. However, the results of the experiments show clearly that their ability to focus on other tasks while using their mobile phones was greatly reduced.

The findings from the experiments also show that texting has the greatest impact on reaction times. This can be explained with reference to research by Reed and Robbins (2008) that shows how texting increases motor, visual and cognitive demands.

Conclusion

Although most people understand that using mobile phones can influence their reaction times, they greatly underestimate the danger of using a mobile phone while walking or driving, and they are not aware of how a few seconds longer reaction time can make it much harder to avoid accidents. It is important to find ways to make the general public more aware of the dangers of using mobile phones in public places, and especially the danger of texting.

Text One

1. Which of the following questions was the research designed to answer?

Note that there may be more than one answer to this.

a. How much time do people spend using mobile phones?

b. Do people react differently to unexpected events when they are using their mobile phones?

c. How important is it to use mobile phones to keep in contact with work, family and friends?

d. How aware are the general public of the dangers of using mobile phones?

e. How well can people do different tasks when they are using their mobile phones?

f. Does texting increase motor, visual and cognitive demands?

2. What two kinds of methods did the researchers use to gather data?

3. Find parts of the text where some of the results from the study are summarized.

4. Find one sentence that generalises the results of the research as a whole.

5. Find parts of the text where explanations for the results are suggested. What words do the writers use to indicate how sure they are that the explanations are correct?

6. Find the recommendation that the researchers give based on their research. Which words in the sentence make it clear that it is a recommendation?

Vocabulary and Grammar Task 1

I. How would you *react* if you were crossing a road and you saw a car coming towards you? What is the noun related to *react?*

II. What is the verb related to the word *unexpected*. Give an example of something *unexpected* that has happened to you. What is the opposite of *unexpected*?

III. Which of the following is closest in meaning to *it is notable* in this context?

a. it is something that we should note down
b. it is important or interesting
c. it is well-known
d. it is obvious

Vocabulary and Grammar Task 1

IV. Which of the following is closest in meaning to *estimate*?

a. carefully measure something
b. calculate something approximately
c. guess how big something is
d. give your opinion about something

V. What does *underestimate* mean? What is the opposite of *underestimate?*

VI. Do you remember *motor, visual* and *cognitive* from previous lessons? One has to do with seeing, one has to do with thinking and one has to do with moving. Can you remember which is which?

Text Two

Discussion

The results showed that chewing gum improved the concentration of most of the participants and increased their short-term memory. This may be due to an increase in activity in the hippocampus area of the brain, which is the key area related to memory (Onozuka et al., 2008). When memories are first forming in the hippocampus, chewing gum helps speed up both the encoding and rehearsal of the new memories (Coon & Mitterer, 2015). The chewing process helps to achieve a positive mood and greater alertness. This allows the brain to focus on present tasks more easily with quicker information processing time.

Conclusion

Our research suggests that chewing gum can improve concentration It also to some extent confirms earlier research that concentration brings various benefits, including improved short-term memory, the ability to focus and increased alertness (Baker et al., 2004). The research, however, has several limitations. The sample size was small, consisting of only 32 participants. Also, only two methods were used to assess the relationship between chewing gum and concentration - self-report by the participants and a simple word test. Further research on the effects of chewing gum with students from different academic fields could be done using a wider range of methods.

Text Two

1. Which of the following questions was the research designed to answer? Note that there may be more than one answer.

a. How are memories encoded in our brain?
b. Does chewing gum help people to remember things?
c. What helps the brain to focus more quickly?
d. Does chewing gum help people to concentrate better?
e. Does chewing gum increase activity in the hippocampus area of the brain?

2. What methods did the researchers use?

3. Find the two sentences in which the results of the study are summarized.

4. Find the part of the text where explanations for the results are suggested.

5. How certain are the writers that the explanations they give are the correct one. Which word tells you this?

6. What are the two limitations of this research?

Vocabulary and Grammar Task 2

I. Complete these two sentences:

One meaning of the noun *term* is "a period of time". So short-term memory must mean "the ability to …….". The opposite of short-term memory is "……..."

II. Do you know what a *code* is? Can you give an example of a *code*? What do you think *encoding* of memories means in this text?

III. *Rehearsal* is a noun related to the verb *rehearse*. When you *rehearse* a play, a song, a dance etc. you practice usually many times in order to prepare for a performance. So what do you think *rehearsal* means when referring to memories in the brain?

Vocabulary and Grammar Task 2

IV. What is the adjective related to the noun *alertness*? Which of the following is nearest to the meaning of *alertness* in this text?

a. feeling very happy about something
b. being fully concentrated on something
c. doing things quickly and efficiently
d. paying full attention to whatever is happening

Task 2: Softening Claims

Softening Claims: Interpreting results

i.e. when you say what you think your results mean and what may be the reasons for them, you are making claims.

When scientists make claims based on their research, they always do so carefully, taking care not to exaggerate.

When you are interpreting your own results, you should also be careful about the claims that you make. You will often need to choose words and phrases that "soften" or "hedge" the claims. Even when you think that the results are very clear, you should avoid making claims that are too strong.

For example, instead of saying that the results of your research 'prove' a theory, you can say that they 'support' it.

Similarly, instead of saying that the findings "show" that something is the case (i.e. they are "true"), you can say that they "suggest" that something is the case.

1. The following are some verbs that can be used to make claims about the results of a study.

confirm, show, suggest, support, indicate

i. Which of these verbs can be used in sentence pattern one below and which can be used in sentence pattern two?

Pattern 1: Verb + *that* clause
The results …… that chewing gum increases short-term memory.

Pattern 2 Verb + object
The results ……. the hypothesis that chewing gum increases short-term memory.

ii. Which of the above verbs would you use to make a strong claim and which would you use to make a weaker ("softer" claim)?

2. Here is a sentence suggesting an explanation for some results.

It is likely that texting increases motor, visual and cognitive demands.

Although *likely* ends in *ly,* it is an adjective. Notice how it is used: *It is ADJECTIVE that …*

The following adjectives all follow this pattern and can be used to strengthen or weaken a claim. How would you rank them in terms of how strong a claim they make?

obvious, possible, likely, certain, probable, clear

Task 3: Reconstructing a Discussion and Conclusion Test

1. Here are some notes for one of the Discussion & Conclusion texts that we examined earlier. Without looking back at the original text, have a go at writing the two sections in full from the notes.

Discussion

Interview data: i. people rely on mobile phones for many purposes

ii. need to use in public areas to keep up with work and in contact with friends/family

Is this why they continue to use them? - they know likely to react more slowly to unexpected events

½ interviewees thought they could multitask effectively using mp

BUT

results from experiment: much less focus on other tasks while using mp

result from experiment: texting has greatest impact on reaction times

Reed and Robbins (2008) texting increases motor, visual and cognitive demands

Conclusion

Most people understand using mp reduces reaction time BUT underestimate danger while walking, driving etc.

Should find ways to make public more aware of dangers – especially texting

2. Now look back at the original text.

i. What are some of the differences between your text and the original text?

ii. Is there anything in your text you now think it would be better to change?

Review

- The purpose of the discussion is to:
  - Interpret findings in light of the concepts from existing theory
  - Acknowledge any findings that differs from the expected results
  - Summarize possible sources of mistake and suggest improvements
- The purpose of the conclusion is to:
  - Summarize key findings
  - Summarize practical and theoretical implications if appropriate

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香港城市大學
City University of Hong Kong

Genre-based Approach to Enhancing Secondary Students' English Writing Ability in Science Subjects

PowerPoint tutorial QR codes

City University of Hong Kong, Department of English
&
Quality Education Fund

QEF project no. 2017/0884

Tutorial 1: What is scientific research?

PPT video

Teaching video

Tutorial 1 PowerPoint video contains activity components on:

- Contextualizing the use of English in science
- Discovering common discourse activities of scientists
- Informing about variations in scientific texts according to different audiences and purposes

Contextualizing activities aim to enable students to incorporate language and science/report writing to shape contexts with higher fluency and competence. Contextualizing activities include listening and taking notes and vocabulary exercises through two video episodes of *Becoming a Scientist: What Does It Take?* and three topically similar texts. Discovering activities aim to help students know the common discourse activities of scientists. These activities involve learning about the role of scientists via the two episodes, naming the steps in scientific discovery, and sequencing a scientific investigation procedure. Informing activities aim to teach about variations in scientific texts, according to different audiences and purposes. Informing activities consist of describing and explaining different kinds of narratives in science communication, comparing long versus short noun groups usages, and complex versus simple sentence usage within the three texts.

Based on *A genre-based approach to enhancing secondary students' English writing ability in science subjects* (Project No.:2017/0884), funded by the Hong Kong Quality Education Fund and carried out by the Department of English, City University of Hong Kong.

To know more, please visit: https://www.teachingscienceenglish.com

Tutorial 2: What are scientific genres?

PPT video

Teaching Video

Tutorial 2 PowerPoint video contains activity components on:

- Identifying the three main purposes of texts, target audiences, and language features
- Recognizing science writing through eight texts
- Sequencing the logical order of science writing

Identifying activities aim to assist students to be adaptive with their writing style by learning the three main purposes of text, finding the target audience, and highlighting the language features of science writing. In two of the steps, identifying activities involve defining the purpose and audience group from four text extracts, followed by describing its language features. Recognizing activities aim to draw students' attention to the different purposes of texts in practice and refine their ability to perceive suitable written content for the science genre. Recognizing activities consist of eight writing extracts, where students would link each of the three purposes and assess its suitability for the scientific report. Sequencing activities aim to improve the organization of information and logical order for science writing. Sequencing activities include reordering different paragraph sections from a set of science text into its logical order after viewing a video related to the topic to provide background information.

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Tutorial 3: Researching a topic and planning your project

PPT video

Teaching video

Tutorial 3 PowerPoint video contains activity components on:

- Describing a variety of sources of scientific information
- Evaluating the reliability of these sources of information
- Planning and organizing a group project, including discerning English language learning opportunities
- Applying principles to identify appropriate information for an English science project

Describing activities introduce a variety of sources of information, including the Hong Kong public library e-databases, Wikipedia, and Google Scholar. Evaluating activities aim to help students develop proper judgment in considering the usefulness of information sources to their own study. Evaluating activities involve finding the indicators of credibility in a source and brainstorming through topics and products. Planning activities aim at enabling students to organize a project topic and perceiving English language learning opportunities as independent learners. Planning activities include the eight steps of scientific enquiry and an exercise to facilitate students to select preferred roles in a science project. Applying activities aim to incorporate the application of previously learned concepts into practical use by identifying information for an English science project.

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Tutorial 4: What is a scientific report?

PPT video

Teaching video

Tutorial 4 PowerPoint video contains activity components on:

- Naming elements of the structure of a scientific report
- Identify the vocabulary and grammar of scientific reports and its application
- Knowing the sequence of sections for students' scientific reports

Naming activities aim at introducing different sections of a science research report. Naming activities provide an exercise to link passages to its corresponding section to help students become familiar with scientific reports. Identifying activities aim to educate about fundamental vocabulary and grammar for science reports to help students make general statements about a topic and report findings in their research reports. Identifying activities involve memorization exercises of key verbs and vocabulary from a passage. Knowing activities consist of sequencing the passage into logical order, based on the students' familiarity of sections in a science research report and their paying attention to certain key phrases and words.

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Tutorial 5: Introduction section, integral and non-integral citations, and reporting verbs

PPT video

Teaching video

Tutorial 5 PowerPoint video contains activity components on:

- Structuring the introduction section through the six elements of an introduction by comparing two texts
- Familiarizing grammar structures in the introduction (i.e., finite, non-finite and modal auxiliary verbs)
- Learning the concepts of integral and non-integral citations using the APA referencing method

Structuring activities aim to introduce the six elements of the introduction section to guide students in organizing the introduction sections neatly. Structuring activities involve reading two texts followed by exercises to sequence paragraphs according to the six elements of an introduction, while considering alternative forms of sequencing and organization. Familiarizing activities aim to demonstrate the grammatical characteristics of an introduction, including finite, non-finite and modal auxiliary verbs. Familiarizing activities involve exercises that lead students to identify and extract grammar functions and keywords, enabling them to explore linguistic features of an introduction. Learning activities consist of grasping the concept of in-text citations and integral versus non-integral citations through the APA method, while suggesting to students strategies to assess citation and referencing practices.

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Tutorial 6: Introduction writing practice

PPT video

Teaching video

Tutorial 6 PowerPoint video contains activity components on:

- Evaluating information for writing the introduction section
- Composing introductions by converting notes into paragraphs
- Developing accurate use of introduction section language features and peer-reviewing skills

Evaluating activities aim to sharpen students' ability to decide on information that is suitable for their report. Evaluating activities involved questions that teachers use as frameworks to enable students to familiarize themselves with key essential information in formulating the introductory paragraph. Composing activities aim at training students to convert their notes into paragraphs with logical order. Composing activities include exercises to write a whole introduction paragraph individually and in groups using provided mock student notes, then allowing students to rewrite their compositions based on the original text. Developing activities aim to improve the accurate usages of introduction section language features and peer assessment criticism skills. Developing activities contain a video illustrating the three verb tenses for introductory paragraphs, writing exercises for students to compose whole texts that draw their attention to previously learnt language features, and peer cross-examination portions.

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Tutorial 7: Methods section and verb forms

PPT video

Teaching video

Tutorial 7 PowerPoint video contains activity components on:

- Learning the communicative purposes of a methods section
- Identifying the characteristics and verb forms of a methods section
- Evaluating the appropriate use of tense and active voice for the methods section

Learning activities aim to increase the students' awareness of the communicative purposes of a methods section. Learning activities include a video on the functions of the methods section and a diagram that illustrates the differences between research and editorial articles, enabling students to be aware of specific features of a science research paper. Identifying activities aim at guiding students to perceive the characteristics and verb forms for describing the methodology. Identifying activities involve group exercises that provide the students opportunities to test their understanding of the differences between research and editorial articles, while underlining the verb forms typically used in research articles. Evaluating activities consist of exercises that guide students in comprehending the effects of choosing specific tenses and active or passive voice in the methods section.

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Tutorial 8: Results section and signposting

PPT video

Teaching video

Tutorial 8 PowerPoint video contains activity components on:

- Learning about the purposes and writing strategies for the results section through the reference-summary-description format
- Explaining verb tense forms of a results section
- Practising describing results with signposts and indicators

Learning activities aim to teach students the purposes and writing strategies for the results section by using the reference-summary-description format. Learning activities include a video on functions in the results section, suggesting approaches to presenting results and exercises to structure the reference-summary-description format. Explaining activities aim to highlight the verb tense linguistic features of the results section. Explaining activities involve extracting verb forms from a text and categorizing them into present or simple past form, while familiarizing students with the accurate verb tense forms in presenting results. Practising activities consist of providing a list of signposts and indicators for students to reference and utilize for writing practice and their own science research writing.

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Tutorial 9: Discussion and conclusion sections and hedging

PPT video

Teaching video

Tutorial 9 PowerPoint video contains activity components on:

- Learning about the purposes and writing strategies of discussion and conclusion sections of a scientific report through three texts
- Exploring language use of discussion and conclusion sections
- Distinguishing sources of error

Learning activities aim to teach students about the communicative purposes of the discussion and conclusion sections, along with strategies to approach writing them. Learning activities involve students identifying elements of a discussion through specific strategies and summarizing main findings for constructing the conclusion. Exploring activities aim to raise students' awareness of the language features of discussion and conclusion sections. Exploring activities involve exercises to rewrite claims using hedging and recalling reporting verbs. Distinguishing activities involve identifying sources of systematic or random error within the research findings.

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Tutorial 10: Reviewing a cohesive scientific report

PPT video

Teaching video

Tutorial 10 PowerPoint video contains activity components on:

- Reviewing the content learned in the past nine tutorial videos
- Exploring how to identify and explain the communicative purposes of different parts of the scientific report
- Practising to improve texts by rewriting scientific report sections

Reviewing activities aim to fortify students' knowledge from previous lessons. Reviewing activities involve a set of revision exercises to recall concepts, including audience group identification, science report structure, grammar characteristics, and citation formats. Exploring activities aim to enable students to identify and explain the communicative purposes of different parts of the science report. Exploring activities include summary notes of communicative purposes of each section of a lab report. Practising consist of activities in which students re-wrote whole texts to improve their quality, based on knowledge learnt throughout previous lessons.

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