A Capstone project entitled:

Effectiveness of technology

in enhancing geographical teaching and learning

in the secondary school:

Hong Kong

Submitted by

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A Project submitted to The Education University of Hong Kong

for the degree of Bachelor of Education (Honours)

(Geography Education)

In April 2024

Declaration

1. I, Chan Yun Sang   , declare that this research / project report represents my own
   work under the supervision of Dr Cheung Kin Wai Norman, and that it has not been
   submitted previously for examination to any tertiary institution.

<div align="center">Declaration on using AI</div>

1. I acknowledge using Free Online Proofreader - QuillBot AI (https://quillbot.com/online-proofreader) to proofread the grammar of my own work and improve writing style. I pasted different paragraphs to the AI tool separately. The output generated by the AI tool was then utilized to correct my grammatical mistakes and writing style in the report.

2. I acknowledge using Chatgpt 4 (https://chat.openai.com/?model=gpt-4) to serve as a picture generator. I sent the following prompts to the AI tool:
   1. Can you create a picture showing the single-point production mode of manufacturing industry in Hong Kong before 1980?
   2. Can you create a picture showing the multi-point production mode of manufacturing industry in Hong Kong after 1980?
   3. Can you create a picture showing that rising wage in Hong Kong and cheaper labour cost in Zhujiang Delta which cause industrial relocation?
   4. Can you create a picture showing that rising land rent in Hong Kong and lower rent in Zhujiang Delta which cause industrial relocation?
   5. Can you create a picture showing that lack of government policy in Hong Kong and a lot government support in Zhujiang Delta which cause industrial relocation?
   6. Can you create a picture showing that loose pollution in Hong Kong and strict pollution control in Zhujiang Delta which cause industrial relocation?
   7. Can you create a picture showing that convenient geographic location between Hong Kong and Zhujiang Delta which cause industrial relocation?

The pictures generated are used for lesson discussion (in appendix 3). Students need to discuss the push and pull factor of industrial relocation based on the characteristics of the picture.

<div align="center">
Signed by: *Chan Yun Sang*
Date: 9/4/2024
</div>

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Introduction

In this modern day and age, technology plays a critical role in driving our world. Geography education is not an exception. More schools have started integrating technology into geography lessons, such as using AR sandbox and VR cave. Harte (2017) stated that technology can break the limitations of geography teaching and achieve better learning outcomes. To evaluate the effectiveness of technological-based geographical teaching and learning at the secondary school level in Hong Kong, this capstone project is designed. Teaching and learning resources are designed for real-time test sessions from 23 January 2024 to 27 February 2024 in Tak Shun Secondary School, based in Ma On Shan. Five consecutive seventy-minutes geography lessons are taught, using of technological-based approaches. The teaching session is done under the supervision of a support teacher. A pre-test is done before the first lesson, and the post-test is done after five lessons. Surveys with scaled responses and open-ended questions, personal observation based on teacher-student interaction, and students' behavior are the other data in this research. In this report, there will be an explanation of the project output and findings based on four aspects, which include student engagement, conceptual understanding, real-world applications, and skill development. The results of the research show that there are positive impacts on students on the four aspects.

Project Output

In this research, five technological-based form 3 Geography lessons are designed based on the assigned topic, 'Global shift of manufacturing industry'. The class size is 20 students. Aalborg Academy Journal of Human and Social Sciences (2020) suggested that technology used in teaching include educational software, multimedia resources, geographic information systems (GIS), virtual reality (VR), and online simulations. The below table shows the technological tools that have been used for teaching by me in these five lessons. The whole project output has be uploaded to the appendix and this Google Drive link:

https://drive.google.com/drive/folders/14hasJPf-oYVIwNd_U32gSh-u-nf3y6Rw?usp=sharing

Lesson	Tools
1	Playposit, Nearpod (Educational software)
2	Google Earth, ArcGIS map
3	ArcGIS story map, Excel
4	Google Earth virtual fieldtrip
5	Google Earth virtual fieldtrip

Lesson 1: Playposit and Nearpod

The learning objectives of lesson one focus on the identification of four types of industries, the explanation of the manufacturing system, and the classification of manufacturing industries based on three criteria.

Before the lesson, an interactive pre-lesson video is made by an app called 'Playposit' (link

of pre-lesson video: https://app.playpos.it/go/share/1880578/1666961/0/0/Pre-lesson).

Students have to answer different kinds of questions, such as multiple-choice, matching,

open-ended, while watching the ten-minute video. This aims to help students to develop prior

knowledge before the lesson. For the main lesson, interactive educational software called

'Nearpod' is used. Interactive functions, such as collaborative board, interactive quiz, polling,

matching game, and competitive concept check game, are added to the lesson PowerPoint

and displayed on the iPad screen (Lesson 1 part 1 powerpoint:

https://drive.google.com/file/d/1MV3lXe5WHRD8hwywUyx_FSDAG1O1kmGD/view?usp=

drive_link , Lesson 1 part 2 powerpoint:

https://drive.google.com/file/d/1ogbobSgoBrAv6AFD3VFIQ3oArrw0OokQ/view?usp=drive

_link).

<u>The score of interactive quiz</u>

玛卡巴卡	1/6	17%	33
羅, Law	4/6	67%	3099
Auston	5/6	83%	4331
Cheng, Colin	2/6	33%	1766
Fung, Kwok	3/6	50%	1599
Him, Ryan Kwan Chun	2/6	33%	366
law, Rex	4/6	67%	2598
Leo	2/6	33%	1699
Matthew	4/6	67%	3031
Ng, Brian	2/6	33%	1932
R	4/6	67%	2933

Collaborative board

What is Industry ?

Write down anything you know about industry ! (Chinese/ English)

Students use their own iPad to track the lesson flow and join the lesson activity in the

Nearpod app to acquire new knowledge. These links are the lesson report of lesson 1 part 1

(https://drive.google.com/file/d/1Yt-AGEc6L1-

[WsUgwgHoK35D3lEEjcFuw/view?usp=drive_link](https://drive.google.com/file/d/1Yt-AGEc6L1-WsUgwgHoK35D3lEEjcFuw/view?usp=drive_link)) and lesson 1 part 2

(https://drive.google.com/file/d/1HTLhQ5_TGa993pbxDnQLMHadBWa-

[AWuo/view?usp=drive_link](https://drive.google.com/file/d/1HTLhQ5_TGa993pbxDnQLMHadBWa-AWuo/view?usp=drive_link)) .
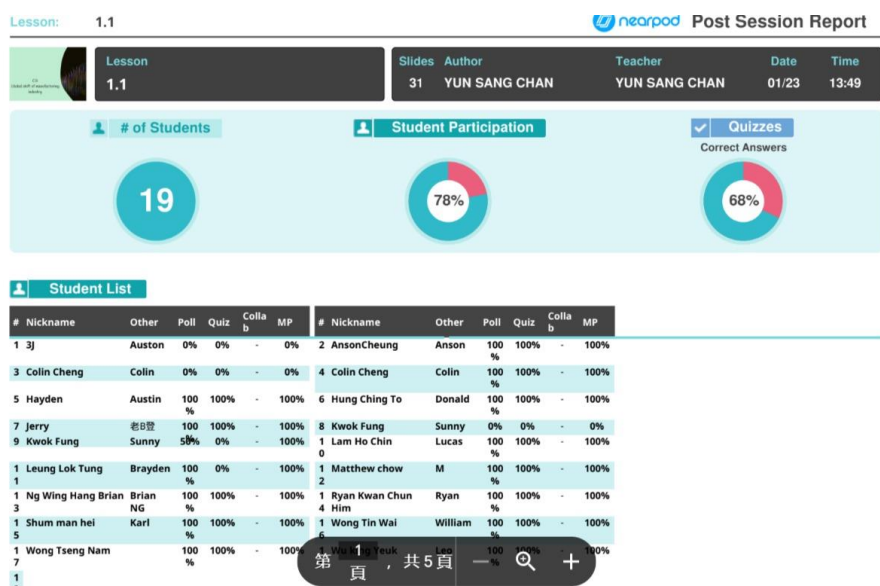
Lesson 2: Google Earth, ArcGIS Map

The learning objectives of lesson two focus on the physical and human factors that affect

industrial locations. In the first part of the lesson, Google Earth

(https://earth.google.com/earth/d/1lTHLDIriwBcAhO29rYPtCjjTqaJ2fAvt?usp=sharing)

was used to show the spatial distribution of the iron and steel industry in Liaoning and how

different factors affect industrial location, students would finish the lesson worksheet at the
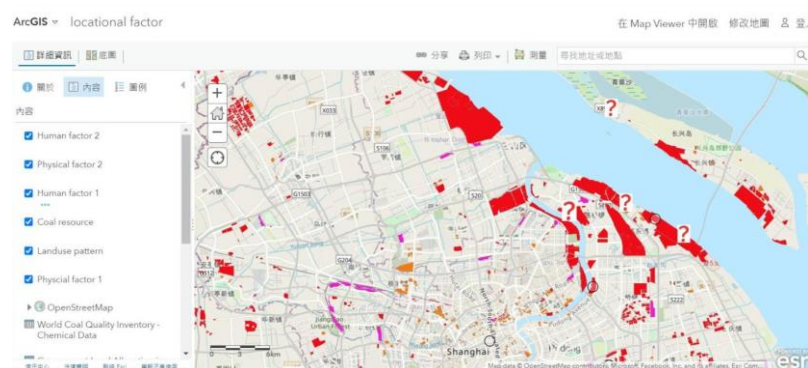
same time.

In the second part of the lesson, a self-made GIS map (https://arcg.is/1LOvLP2) in ArcGIS

is used to assess students' learning outcomes. Students have to finish the lesson worksheet

asking about the locational factor that favours the successful development of heavy industries

in Shanghai by reading the GIS map and following the guides in the worksheets.

Lesson 3: ArcGIS story map, Excel

The learning objectives of lesson three focus on the location distribution of the manufacturing

industry in Hong Kong, the identification of the major manufacturing activity in Hong Kong,

and the factors behind the industrial relocation to the Zhujiang Delta since the 1980s. Self-

made interactive ArcGIS story map

(https://storymaps.arcgis.com/stories/ed00ccb723b944399ab26e376d9351a1) was used to

show the informative content as a story with a timeline. Students can acquire new knowledge

by following the timeline in the story map and exploring the exact location of industrial

activities with the zoom-in and -out function. To explain the push and pull factors, AI-

generated images are used to facilitate discussion (see appendix 3 for the generated pictures).
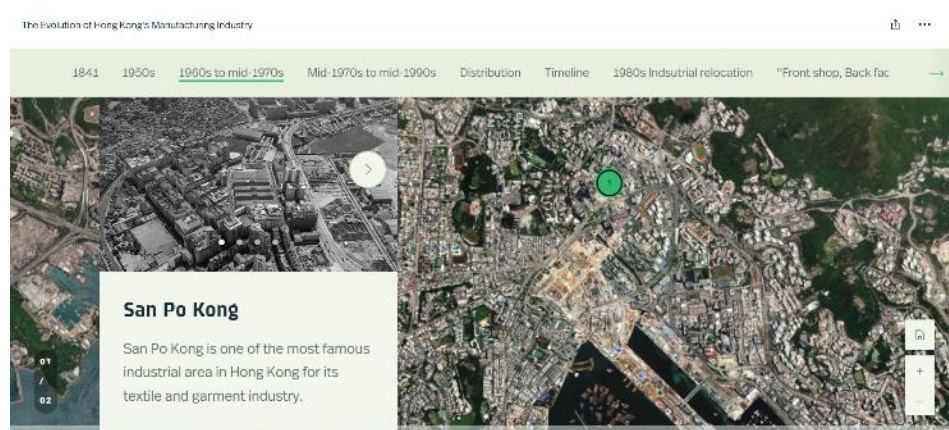
An excel spreadsheet (https://docs.google.com/spreadsheets/d/1uaCVNIlbQIQfcCMcA-

TtMszzT9wJEAMW/edit?usp=drive_link&ouid=111854117720062662955&rtpof=true&sd=

true) is also used to compare the cost difference of setting up a factory in Hong Kong and

Zhujiang Delta.

Lesson 4: Google Earth virtual field trip

The learning objectives of lesson four focus on the distribution of industrial belts around the world. An inquiry-based Google Earth virtual field trip is designed (https://earth.google.com/earth/d/1Zw_gg4ABHBYH4mlrfA67uf_kfWJy_SCc?usp=sharing). Students have to find out the answer by themselves by following the guides and answering the questions in Google Earth.

Lesson 5: Google Earth virtual field trip

The learning objectives of lesson five focus on the locational factors that favor the formation of industrial belts and agglomeration economies by using a case study of the car industry in the Great Lakes Region. Another virtual field trip is designed for students (https://earth.google.com/earth/d/1T-85LEI_Go19XzGtqKS5ZtGzBIbh1vL2?usp=sharing). Students have to explore new knowledge by themselves, which is one of the characteristics of inquiry-based lesson activities. After they finish the worksheets, their answers will be checked and explained.

Findings

Finding 1: Technology can increase students' engagement in geography lessons

Technology can boost students' engagement level during the lesson. In lesson one, I used different functions in 'nearpod' to create a more engaging learning environment. The effects of the interactive quiz, polling and gaming function are the most obvious. While using the polling function, all the students need to express their own views by clicking the button on their iPad screen. This let me know their views and trigger further discussion. While using the interactive quiz, intense classroom debates happened, and I could also access students' new knowledge. While using the gaming function, students enjoy playing the matching game to match a specific industry and its type of industry together. These functions create a more inclusive and responsive learning environment which can encourage students to develop their enthusiasm for geography. A survey question about engagement level is also asked, average marks of 4.53 over 5 are recorded when asking students if they are more engaged and interested in the lesson when technology is used. This shows the technological approach is effective in increasing the level of student engagement during geography lessons.

I felt more engaged and interested in the lessons when technology was used.
15 responses
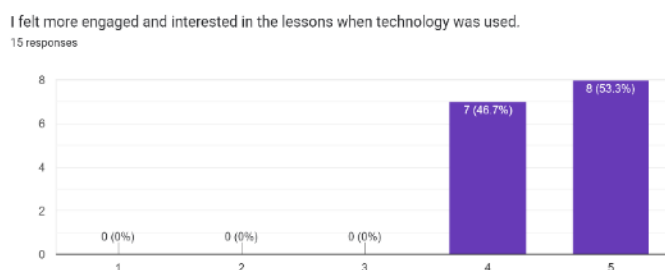
Finding 2: Technology can boost conceptual understanding in geography lesson

Technology can demonstrate the geographical concepts in a more dynamic way, thus boosting a deeper conceptual understanding. In geography, some knowledge is informative and abstract to understand. For instance, I had to teach the evolution of industries in Hong Kong. I chose to use the ArcGIS story maps. Students explore the new knowledge by reading the story map together in the form of a group. The story map with narrative structure and timeline shows the knowledge visually through photos, and multimedia resources. This helps students to understand the informative new knowledge easier and in a shorter time. In lesson 4 and 5, the Google Earth virtual field trip allows students to explore global industrial patterns in an immersive way. Students can use their own way and pace to learn. A survey question asking students about their views towards the influence of technology usage on their conceptual understanding scored the highest marks among all questions, 93% of students agreed that technology helped them have a better understanding of geographic concepts and processes. The score differences between the pre-test and post-test also supports this finding. The pre-test average score was 15.1 over 36 and the post-test average score was 17.7 over 36. These data suggest an affirmation into the integration of technology to geography lessons is effective in boosting students' conceptual understanding of the subject.

The technological tools (e.g., interactive maps, simulations) helped me to better understand geographic concepts and processes.

15 responses
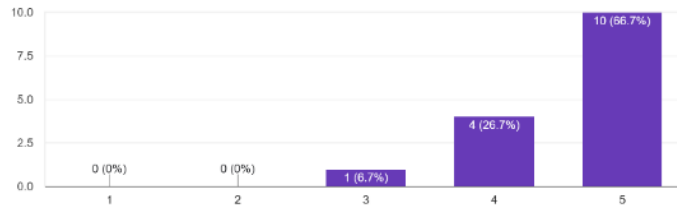
Chapter 5 unit 1-3 pre test

This pre-test is only designed to explore the adoption of technology in geography teaching. Your participation is crucial in providing insights for our research study. We want to assure you that your responses will be kept confidential, and no personally identifiable information will be collected. The data will be retained solely for the duration of the research project and will be securely deleted once the research report is released.

* Indicates required question

1. 1. What is your class and class number? *

   3J 16

2. 2. What is industry? Write down anything that you know about industry *

---

1. What is your class and class number? *

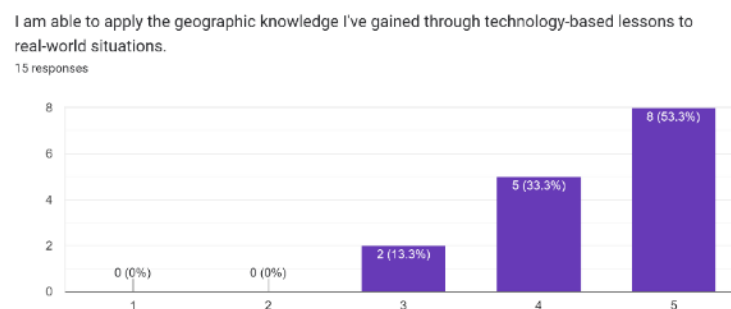   3J 16

2. What is industry? Write down anything that you know about industry after 5 lessons *

   industry refers to a wide range of economic activities

3. What are the four types of Industries ? *

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1. 1. What is your class and class number? *

   3J (10)

2. 2. What is industry? Write down anything that you know about industry *

   Primy industy   Seconder industry

---

1. What is your class and class number? *

   3J(10)

2. What is industry? Write down anything that you know about industry after 5 lessons *

   Industry refers to a wide range of economic activites, including obtaining natural resources, providing services, and developing information technology.

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Finding 3: Technology can connect practical knowledge and the real-world scenario

Technology can connect theoretical knowledge with real-world applications. In this school, the support teacher told me that the original learning approach in the geography lesson is finish the worksheet from the publisher by finding the answer in the textbook, which is a quite traditional. At the same time, the content such as texts and images can be outdated and learning can only be limited to textbook content and examples. In contrast,, technology can provide a more updated and practical content such as 3D street view. While conducting the inquiry-based virtual fieldtrip in lesson 4 and 5, students actively use the zoom in and out functions in Google Earth to explore the geographical landscapes and industrial distributions. These kinds of spatial dynamics images cannot be provided by textbooks and traditional approaches. By using technology, students can connect their knowledge to real world scenarios more easily, such as geographic features and phenomena. In the survey, students also expressed that the learning experience provide by Google Earth provided a more enjoyable experience and a deeper understanding of the connection between real world context and knowledge. Some 'wow' moments were also recorded during the lesson.

I am able to apply the geographic knowledge I've gained through technology-based lessons to real-world situations.
15 responses

15

Which part of the technology-based geography sessions or which specific educational tool did you find most beneficial for your learning?

15 responses

- Nearpod
- ArcGIS story map
- ArcGIS map reading
- Google Earth virtual fieldtrip

66.7%

20%

13.3%
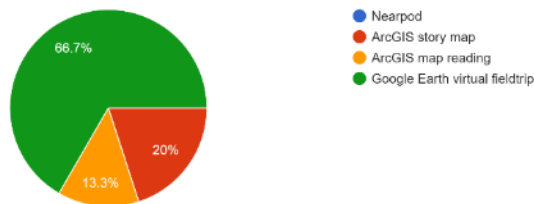
According to the last question. Please explain why.

7 responses

Cuz it's fun

,

Because it let me more understand geography

N

促進學生對世界地圖的認識

That's great

Because , slideshow make me can know more about the geography

15 responses

No

Use more map

I feel good

I think we can use more google earth for learning

沒有

Add Some Chinese translate

good

It can more intuitively see the branches of the factory

Mr Chan so nice
Use more map

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Finding 4: Technology helps students develop essential skills in geography learning.

Technology can help students develop essential skills in geography. The University of Nebraska Omaha (n.d.) stated that technology is beneficial to students development on spatial awareness, analytical thinking, critical thinking and collaborative skills. For example, in the lesson, students need to analyze the relationship between locational factors and the successful development of heavy industries in Shanghai by reading the GIS map. They must find evidence in the map to prove it. This helps them to develop a better analytical thinking. When students explore the industrial belt in Google Earth, they can observe the distribution of the industrial distribution between major cities and resources in a different angle. This helps them to develop a better spatial awareness. A survey question about influences of technology on skill development is asked, average marks of 4.4 over are recorded when asking students if they agree technology can help them to develop essential geographical skills. This shows the technological approach is effective in developing essential skills in geography during geography lessons.

Learning with technology has helped me develop new skills (e.g., research, digital literacy) that I can use in other areas of my studies.

15 responses
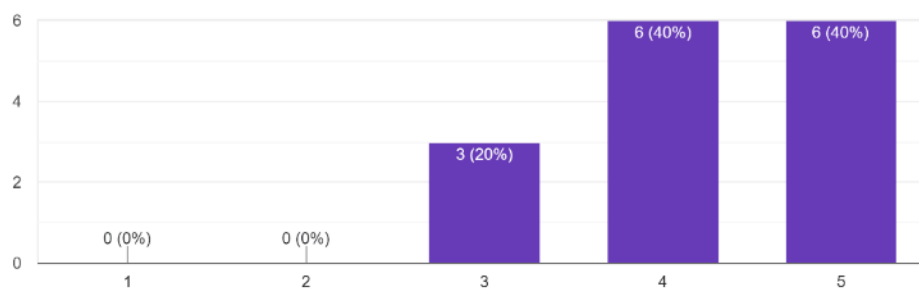
Conclusion

The effectiveness of technology in enhancing geographical teaching and learning has been

discussed in this capstone project report. The integration of technology can alleviate

geography teaching and learning. If more schools continue to explore and integrate

technology in Hong Kong, geography education can become more modernized.

Appendix 1: Lesson 1 teaching and learning resources

<u>Lesson Plan of lesson 1</u>

上課日期 Date of lesson: 23/1

上課時間 Time : 13:55-15:05

主題 Topic: What is industry, Manufacturing system, classification of manufacturing industries

Prior knowledge 學生先備知識：

1. Students should have basic knowledge of this new topic as they have watched the pre-lesson video
2. Students should be able to list out some of the inputs in the manufacturing system
3. Pre-lesson video before lesson 1:
   https://app.playpos.it/go/share/1880578/1666961/0/0/Pre-lesson

學習目標 Learning objectives

1. Identify the four types of industries: Primary industry, Secondary industry, Tertiary industry, Quaternary industry
2. Explain the process of the manufacturing system
3. Classify different types of manufacturing industries by three criteria: weight of raw materials, Input of labor and capital, Level of technology

教學資源/工具/設備 Learning resources：Nearpod, powerpoint, notes, textbook

Link of pre-lesson video: **https://app.playpos.it/go/share/1880578/1666961/0/0/Pre-lesson**

Link of nearpod interactive slide pdf (lesson 1 part 1):
https://drive.google.com/file/d/1MV3lXe5WHRD8hwywUyx_FSDAG1O1kmGD/view?usp=drive_link

Link of nearpod interactive slide pdf (lesson 1 part 2):
https://drive.google.com/file/d/1ogbobSgoBrAv6AFD3VFIQ3oArrw0OokQ/view?usp=drive_link

Link of student participation report generated by nearpod (lesson 1 part 1):
https://drive.google.com/file/d/1Yt-AGEc6L1-WsUgwgHoK35D3lEEjcFuw/view?usp=drive_link

Link of student participation report generated by nearpod (lesson 1 part 2):
https://drive.google.com/file/d/1HTLhQ5_TGa993pbxDnQLMHadBWa-AWuo/view?usp=drive_link

時間 Time	教學重點/內容 Teaching Content	學生任務 Students' task	學習重點 Key learning	Assessment/Resource 評估/教學資源
5	Introduction • Students get in the nearpod lesson • Three key points of this chapter: Global shift of/ Manufacturing/ Industry • T: we will start this chapter by examining the Industry first • T: Do you still remember the pre-lesson video? • 30 seconds thinking time: What is industry • Use the collaboration board function for students to share their thoughts	• Think about 'what is the industry' • Share thoughts on the collaboration board	• Introduce the new chapter • Test the prior knowledge of students	• Nearpod

15	Explain the definition of industry in the textbook	• Vote about types of industry	• Definition of industry: A wide range of economic activities	• Powerpoint
	• Poll: How many types of industry	• Observe the characteristics of the four industries and answer the questions	• Four types of industry and their characteristics	
	• Show the photo of the four industries			
	• Question: According to this photo, what do you think about the characteristics of this industry?	• Watch video		
	• Primary-> Natural resources			
	• Secondary-> Manufacturing			
	• Tertiary-> Customer service			
	• Quaternary-> IT			
	• What a 3 minutes video about four types of industry as a recap			

10	• Question: Use one minute to discuss with your classmates, can you describe and explain the relationship of the four types of industry? • Answer: closely link together • Explanation: Extraction of cotton-> Turn into T-shirt-> Send to shop-> Online app for ordering a T-shirt • Question: can you use another example to explain the relationship of the four types of industries • Start the matching game in Nearpod to check the new knowledge: Match different industries with their relevant types of industry • Discuss the relationship between four types of industries	• Discuss about the relationship of four types of industries • Answer the question • Play the matching game	• Relationship of the four types of industries	• Nearpod

5	Break time			
15	• MC question: Which type of industry does the manufacturing industry belong to? • Use the Garment industry as an example to explain the manufacturing system • Scenario discussion: We are the boss of a garment factory. What are the essential elements to produce a T-shirt? • Play a video about the process of turning the cotton into a finished T-shirt	• Answer the MC question in nearpod • Watch the video and find out what the essential inputs of producing a t-shirt • Share your thoughts about essential elements of producing a t-shirt on the collaboration board • Answer the question	• Manufacturing system • Inputs: land, energy, water, raw materials, labor, capital, transport, machinery • Processes: cutting, sewing, and packaging • Outputs: useful and useless outputs	• Nearpod

	• Ask students to share their thoughts on the collaboration board • Introduce the Inputs in a manufacturing system • Question: Now, we know that we have the inputs, what should we do next? • Start producing garments through different processes • Outputs (Useful and useless) are generated after inputs and processes • Question: After obtaining outputs, what should we do? (sell for money) • MC question: How should we use the profit money? (Invest back into the inputs to make the manufacturing system sustainable)		

| 10 | • Play another matching game about the classification of manufacturing industries
before learning new knowledge

• Explain the answer to the matching pair game
• Show the photos of the electronic industry and steel industry

• Question: What are the characteristics of these industries in terms of weight of raw materials and products

• Show the photos of the garment industry and shipbuilding

• Question: What are the characteristics of these industries in terms of input of labor and capital

• Show the photos of the IT industry and toy industry | • Play the matching game

• Answer the questions | • Answer the questions

• Classification of the manufacturing industries by three criteria

• Weight of raw materials and products, Input of labor and capital, Level of technology | • Nearpod |

	• Question: What are the characteristics of these industries in terms of level of technology • Poll activity: Describe the toy industry in terms of three criteria • Play the matching game			
10	• Play 'Time to climb' (Kahoot function in nearpod) to check students' new knowledge • Allocate notes to students • Summarize all the content in this lesson • Recap question: • List out the four major types of industry according to the textbook	• Play 'time to climb' • Copy notes • Answer question	• Concept check • Ensure all learning objectives are achieved	• Powerpoint

• Describe the relationship of the above industry by using the garment industry as an example • What are the components of the manufacturing system? • Describe the characteristics of the aircraft manufacturing industry by three criteria			

Chapter 5: Global Shift of Manufacturing Industry
Unit 1.1-1.2 notes

1.1 What is **INDUSTRY**

a) Industry refers to **a wide range of economic activities**.

1. Primary Industry ● Extracting and obtaining **natural resources** Example: Farming, Mining	
2. Secondary Industry ● Turn **raw materials** into **semi-finished/ finished** products Example: Manufacturing industry (Garment, Iron and steel, Car-making)	
3. Tertiary Industry ● Economic sector that **provides services for customers** or other industries. Example: Retail and Banking	

4. Quaternary Industry ● Involves **research and development (R&D)** and **information services**. Example: Software development, Media, Information technology (IT)	

The linkage of four industries

Primary Industry:

Farmers grow cotton to provide raw materials for making clothes

Secondary Industry:

In factories, cotton is turned into fabrics, which are then used to make clothes

Tertiary Industry:

Salespeople sell clothes to customers

Quaternary Industry:
- Software is used to study the purchasing habits of customers and to promote new products.
- Computers and machines are used to increase productivity
- New technology is developed to raise cotton yields

1.2 What is **MANUFACTURING INDUSTRY**

a) Example of Manufacturing system: Garment industry

Inputs ⟶ Processes ⟶ Outputs

Money as investment ⟵ Market
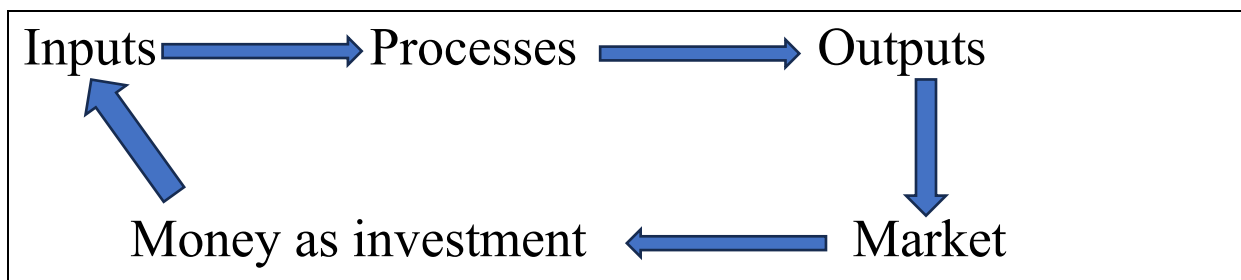
Step 1: **Physical and Human Inputs** (The resources to make garments)

Physical Inputs	Human Inputs
- Land - Energy - Machinery - Water - Raw materials	- Labour - Capital - Transport

Step 2: **Processes** (Raw materials are turned into finished products)

Such as cutting, sewing, packaging

Step 3: **Outputs** (Useful and Useless)

Useful Outputs	Useless Outputs
- Dresses - Shirts - Pants	- Fabric scraps - Sewage - Air pollutants

Dresses are the **<u>useful outputs</u>** of a manufacturing system. They are **<u>sold on the market for money</u>**, which **<u>is invested in the system again as inputs</u>**.

b) Types of manufacturing industries (Textbook p.7)

Criteria	Type	
Weight of raw materials and products	Light Industry - lighter weight Example: Electronics industry	Heavy Industry - **heavier** weight Example: Iron and steel industry
Input of **labour and capital**	Labour-intensive industry - higher input of labour Example: Garment industry	Capital-intensive industry - higher input of capital Example: Shipbuilding
Level of **technology**	Low-tech industry - Lower level of	High-tech industry - Higher level of

	technology	technology
	Example: Plastics industry	Example: IT industry

Appendix 2: Lesson 2 teaching and learning resources

<u>Lesson plan of lesson 2</u>

上課日期 Date of lesson: 30/1

上課時間 Time : 13:55-15:05

主題 Topic: The factor that affects industrial locations

Prior knowledge 學生先備知識：

1. Students have learned about the types of industry and manufacturing industry

2. Students may know locational factors from daily life. For example, they may not know that transport is one of the important factors

學習目標 Learning objectives

1. Describe and explain how physical factors affect industrial locations.

2. Describe and explain how human factors affect industrial locations

教學資源/工具/設備 Learning resources：Powerpoint, Google Earth, ArcGIS, textbook, notes

Link of Powerpoint slide of lesson 2:

https://docs.google.com/presentation/d/1BHe_nE1hgjc1mVv-KEJBZM_9GyBPog9M/edit?usp=drive_link

Link of Google Earth to demonstrate industrial distribution of Liaoning:

https://earth.google.com/earth/d/1xa0KB6RKMmv0CAg1X2gepba_uVbf6-wh?usp=sharing

Link of Self-Made ArcGIS map for students to do map reading:

https://arcg.is/1LOvLP2

時間 Time	教學重點/內容 Teaching Content	學生任務 Students' task	學習重點 Key learning	Assessment/Resource 評估/教學資源
5	Recap the knowledge of the last lesson: Question: - List out the four major types of industry according to the textbook - Describe the relationship of the above industry by using the garment industry as an example - What are the components of the manufacturing system? - Describe the characteristics of the aircraft manufacturing	- Review the textbook p.4-7 - Answer the recap question	- Reinforce the prior knowledge	- Powerpoint

	industry by three criteria			
20	Introduction of the new topic: How to determine the location of a factory - Question: We have different inputs in the manufacturing system, which one is the most important if we want to construct a factory? - Example 1: garment industry - Question: Identify the most important input in labor-intensive industries, such as the garment industry. How	- Answer question - Finish worksheet	- Describe and explain how human factors affect industrial locations	- Powerpoint - worksheet

	does it affect the location of the garment industry? - Finish worksheet P.1 Q1a - Example 2: IT industry - Question: Find out the similarities of Science Park and Cyberport in the aerial photo - Finish worksheet p.1 Q1b - Labor is one of the factors - Show the news about the development of the IT hub in Lok Ma Chau to explain government policy is also a factor		

	- Finish worksheet Q4 - Example 3: the boss of the glass production company - Question: Based on the characteristics of the glass, should we locate our factory near or far from the market - Finish worksheet Q2 and Q3 - Explain market is another locator when determining the location of a factory - Question: How can our company deliver the finished product to market?		

	- Finish worksheet Q3 - Explain transport is another factor			
5	A summary of the new knowledge: the human factor - Check the answer of the ws p.1-2 human factors	- Check answer	- Reinforce the new knowledge	- Worksheet
15	- Physical factor - Introduction to the iron and steel industry - Play a video about the production of the iron and steel industry - Introduce Anshan	- Observe the relief of Anshan such as the Liaohe plain - Observe the distribution of major industrial hubs in China - Measure the distance between the iron and steel factory and the power source - Measure the distance between the	- Describe and explain how physical factors affect industrial locations	- Google Earth - Worksheet

	- Group activities by Google Earth - Four people per group - Students have to finish the question from p.2 to p.4 by the information provided on Google Earth - After the completion of the worksheet - Pick some of the students to present their answers in front of the class - Check the answers to the worksheet together - Many factors need to be	iron and steel factory and the source of raw material - Match the locational factor with the relevant in the worksheet		

	considered when determining the location of a factory. While industries take multiple locational factors into account when deciding where to establish operations, some factors are more important than others.			
20	Access new knowledge by Arcgis map - Introduction to Shanghai: Shanghai is a financial hub, but it is also an industrial hub. - Show the location of the iron and steel factory in Shanghai on Google map - Show the location and photo of tourist spots in Shanghai on Google map	- Check each layer in the GIS map to find evidence and match it with the locational factors - Finish the worksheet	- Check student's understanding of the new knowledge	- Google Earth - GIS map - Worksheet

	- 15 mins Group activities: Students have to do a case study about the shanghai - Objective: Refer to the map information, and explain why Shanghai is a suitable place to develop an iron and steel factory. - Students have to find evidence to match with the locational factor to explain how the locational factors favor the development of the iron and steel industry - Invite students to present their answer		

| 5 | Summarize all the content in this lesson with three key questions

- What are the human factors when determining the location of a factory?

- What are the physical factors when determining the location of a factory?

- Use Shanghai as an example, and explain why it is a suitable place for the development of the iron and steel industry | - Copy notes
- Answer question | - Concept check
- Ensure all learning objectives are achieved

- | - Powerpoint |

Chapter 5: Global Shift of Manufacturing Industry
Unit 1.3 Locational Factors
Lesson worksheet

Name: _____   Date: _____

Class: _____

1. HUMAN FACTORS

Human factors relate to the social, economic, and cultural aspects of a location, influenced by human presence and activities. These factors include:

Factors	Guiding questions
1. _____	a) Identify the most important input in labour-intensive industries, such as the garment industry. _____ ⇨ Labour-intensive industries are located in **DENSELY/SPARSELY** populated areas where **CHEAP/EXPENSIVE** labour is abundant. (Consider the cost of labour and population density in your answer) b) High-tech industries require **SKILLED/NON-SKILLED** labour ⇨ For example: The IT industry is often located near areas with a concentration of **WELL-EDUCATED/POORLY EDUCATED** R&D professionals. (Think about the level of education and skills required in these industries) ⇨ Such as: Near the _____
2._____	a) Glasses, are a useful but bulky, fragile output in a manufacturing system. If you are the boss of a company that produces glasses, you will choose to locate your factory:

	• **FAR AWAY FROM THE MARKET/ NEAR THE MARKET** b) Why? ⇨ **INCREASE/ REDUCE transport cost** ⇨ **INCREASE/ REDUCE product loss** • **Market-oriented industries** are located near the market to reduce transport costs and product loss. These are the example of*Market-oriented industries* • Cars, Glasses, Dairy products
3._____	a) In the manufacturing system, we need to deliver our useful output to the market by _____ to gain profit. • Such as highways, railways, container terminals, and airports
4._____	Some governments provide manufacturers with incentives to boost industrial development. For example, the government may offer low-interest loans, favourable tax rates and good infrastructure.

2. PHYSICAL FACTORS

Physical factors are the natural features and environmental aspects of a location. They are intrinsic to the geographical and ecological makeup of an area and are not created by human activity. These factors include:

Factors	Guiding questions
1. _____	a) In China, are iron and steel factories typically located in inland areas, coastal areas, or both? • **INLAND AREA/ COASTAL AREA/ BOTH** b) What type of land is most suitable for large-scale iron and steel production? • **EXTENSIVE/ LIMITED** • **CHEAP/ EXPENSIVE**

	● **FLAT/ HILLY**
	⇨ Many of them are located in **coastal** areas but some are also located in inland region. For example: **Lanzhou**
	⇨ Reclamation can extend the scale of production
2._____	The iron and steel factories consume a large amount of energy by burning coal.
	a) Are the iron and steel industries in Anshan located near or far from coal mines?
	● **NEAR/ FAR AWAY** from the coal mines
	⇨ **INCREASE/ REDUCE** the transport cost of energy resources
	Industries that consume large amounts of energy are called _____
3. Raw material	Iron ore is a very important raw material in iron and steel processing.
	a) In Anshan, iron and steel industries are located: ● **NEAR/ FAR AWAY** from the iron mines
	⇨ **INCREASE/ REDUCE** the transport cost of energy of the bulky, heavy or perishable raw materials
	_____ are located the sources of raw materials to reduce transport costs.

"What human factors affect the location of the iron and steel factory in Anshan?"

Human factors	Guiding questions
1. _____	● Heavy industries nearby require iron and steel. Such as Shipbuilding, Aircraft manufacturing, Heavy machine
2. _____	● Skilled labour can be provided from Shenyang because of the high population density
3. _____	● Presence of railway, airport, port

46

	• Coking coal, another important raw material in iron and steel production, is transported from Shanxi by railway.
4. _____	• Early development of transport infrastructure

Shanghai is also a famous iron and steel industry centre. Discuss how its locational factors are favourable to the development of the iron and steel industry by studying the GIS map."

HUMAN FACTORS

1. _____

Presence of infrastructure	Yes/ No
Airport	
Railway	
Port/ Container terminals	
Highway	

Advantage:
• Facilitate the _____ and _____ of raw materials and finished products.

2. _____

According to the map, what are the types of heavy industries that rely on iron and steel in Shanghai? • _____ • _____ • _____ Advantage: • Locating the iron and steel factory near the market can help to _____ .

47

3. Labour

Well-educated workforce, large working-age population make Shanghai become an attractive location for industries like iron and steel.

4. Government Policy

Example: open door policy provides tax free benefits, low interest loan and good infrastructure to attract investments.

PHYSICAL FACTORS

1. Land (**COASTAL/ INLAND**)

Advantage:
- _____can be carried out to expand the scale of production

- Supply of water for production and cooling process

Characteristics of land
Extensive/ Limited
Flat/ Hilly

2. Energy

a) According to the map, where does the energy power supply come from in Shanghai ?
   _____

Advantage:
- With technological improvement, _____- oriented industries can also be located at places with _____ and _____ power supplies.

3. _____

- Iron ore is imported from other countries
- Coal comes from the coal base in China

Chapter 5: Global Shift of Manufacturing Industry
Unit 1.3 notes

1.3 What are the **factors that affect industrial locations?**

Physical factors	Human factors
4. Land - Particularly important to heavy industries - Extensive, cheap, and flat island is found in coastal area - The scale of production can also be expanded by reclamation	1. Labour - Labour-intensive industries: located in a densely populated areas where cheap labour is abundant - High- tech industries: commonly found near universities where well-educated R&D professionals can be found
5. Energy - Power-oriented industries consume large amounts of energy. - Example: The Iron and steel industries located close to coal mines to reduce the transport cost of energy resources - With technological improvement, it can be located in places with stable and cheap power supply	2. Transport - A good transport network - Highways, railways, container terminals and airports ⇨ Transport raw materials and products efficiently
6. Raw material - Some industries need bulky, heavy, or perishable raw materials - Locate near the sources of raw materials to reduce transport costs - Examples of raw material-oriented industries are iron and steel, food processing, and sugar industries	3. Market - Some industries produce bulky, fragile, perishable goods - Market-oriented industries: locate near the market to reduce transport costs and product loss
	7. Government policy

| | - Incentives such as low-interest loans, favourable tax rates, and good infrastructure |
| | ⇨ Attract investments |

Appendix 3: Lesson 3 teaching and learning resources

<u>Lesson Plan of lesson 3</u>

上課日期 Date of lesson:　6/2

上課時間 Time : 13:55-15:05

主題 Topic: What is the manufacturing industry of Hong Kong like

Prior knowledge 學生先備知識：

1.　Students may have watched the video about the manufacturing industry in daily live

學習目標　Learning objectives

1.　Describe the location distribution of the Hong Kong manufacturing industry between the 1950s to the late present
2.　Identify the major manufacturing activity between the 1950s and to present
3.　Explain the push and pull factors that have caused industrial relocation since the 1980s

教學資源/工具/設備 Learning resources：ArcGIS story map, excel, textbook

Link of ArcGIS story map:

https://storymaps.arcgis.com/stories/ed00ccb723b944399ab26e376d9351a1

Link of Powerpoint of lesson 3:

https://docs.google.com/presentation/d/1Hwhy36-
S56IrRE2AozVVJDec8iEET9pQ/edit?usp=drive_link&ouid=111854117720062662955&rtpof=true&sd=true

Link of cost calculation excel sheet:

https://docs.google.com/spreadsheets/d/1uaCVNIlbQIQfcCMcA-
TtMszzT9wJEAMW/edit?usp=drive_link&ouid=111854117720062662955&rtpof=true&sd=true

時間 Time	教學重點/內容 Teaching Content	學生任務 Students' task	學習重點 Key learning	Resource 教學資源
10	Recap the knowledge of the last lesson : - Question: Identify the four human factors and three physical factors that affect industrial location - Use the iron and steel industry in Shanghai as an example, and describe and explain how the location of the iron and steel factory in Shanghai favors its development. - Check the answer to workbook p.1-2	- Review the notes and textbook, focusing on the questions provided - Discuss with their groupmate first. Then, answer the question - Check the answer	- Reinforce the taught concepts: how physical and human factors play a critical role in determining industrial locations - Ensure students can apply the knowledge again to explain the real-world example (Shanghai) - Check student's previous knowledge and areas that may require further explanation	- Powerpoint

10	- The Early Development of Hong Kong's Manufacturing Industry (1950s-1960s) - Introduction to the origins of Hong Kong's manufacturing industry: Light and labor-intensive industries. - Identify the distribution of factories along Victoria Harbour and their significance - Key Questions: - What factors contributed to the rise of light and labor-intensive industries in Hong Kong during the 1950s and 1960s? - Why were factories primarily located along Victoria	- Read the story map, and identify and observe the concentration of industries in Hong Kong during the 1950s and 1960s.	- The distribution of factories and the major manufacturing activity in the 1950s to 1960	Powerpoint Storymap

	Harbour, and how did this geographical choice benefit their operations?			
10	The expansion of manufacturing from the urban area to the New Territories: - Introduce the development of industrial estates and multi-story factories. - Explain how Hong Kong's manufacturing industry become more diversified. Electronics, toys, and watches developed rapidly because of the global market demands and local economic policies.	- Observe the before-and-after maps or data charts in the ArcGIS StoryMap which show the geographic and sectoral shift in Hong Kong's manufacturing industry. - Identify patterns and reasons for these changes	- The distribution of factories and the major manufacturing activity in 1960s to 1990s	Powerpoint Storymap

	Key questions: - What were the main factors behind the geographic expansion of Hong Kong's manufacturing industry to the industrial estates during the 1960s to mid-1970s? - How did the diversification of manufacturing industries, from primarily textiles to electronics, toys, and watches, impact Hong Kong's economic development?			
5	The transition from traditional manufacturing to high-tech industries in Hong Kong: - A brief introduction to the era of high-tech industrialization in Hong Kong and the factors	- Read the story map about the transition to high-tech industries in Hong Kong	- The distribution of factories and the major manufacturing activity from the 1990s to the present	Powerpoint Storymap

	leading to manufacturing relocation. Key questions: - What factors contributed to Hong Kong's shift towards high-tech industries in the late 1990s?			
5	Recap - The transformation of Hong Kong's manufacturing industry - The diversification of industries and the shift towards high-tech sectors	- Recap the knowledge and check if there is any confusion	- An overview of the key points and learning outcomes from the first part of the lesson - Reinforce students' understanding of Hong Kong's industrial transformation	- Powerpoint

10	The industrial relocation of Hong Kong's manufacturing to ZDR since the 1980s - Explain different factors that lead to the shift of the manufacturing industry from Hong Kong to ZDR. Key questions: - What factors contributed to the relocation of Hong Kong's manufacturing industry to ZDR, and how did this relocation impact both regions?	- Read the story map about the geographic shift of industries	- The reasons and implications of the manufacturing industry's relocation from Hong Kong to ZDR	Powerpoint Storymap

10	- The push and pull factors that caused industrial relocation: - Compare the costs involved in setting up and operating a manufacturing facility in Hong Kong versus ZDR. - Factors: Lower wages, Lower rent, Loose pollution control, government support such as lower tax rate. - Key questions: How do the differences in operational costs between Hong Kong and ZDR justify the relocation of manufacturing industries? - All the factors are related to	- Input data into the Excel - Compare the costs such as wages, rent, government incentives, and operational expenses in Hong Kong and ZDR. - Total cost calculations to understand the economic appeal of relocation.	- Push and pull factors of industrial relocation by Excel	Excel Powerpoint

|				
	cost as the company aims to maximize profit and minimize cost			
5	Explain why such differences exist - Wage: Larger population ZDR - Rent: Low-lying relief provides extensive flat land - Government support: Tax incentive, discount rent - Pollution control: Environmental protection measures are not required	- Copy notes	- Explain all the factors comprehensively	Powerpoint

	- Geographic location: Similar culture			
5	Summarize the content of this lesson - Key questions: - How did Hong Kong's manufacturing industry evolve from the 1950s to the present, and what were the key factors driving these changes? - What were the main economic and policy reasons behind the relocation of Hong Kong's manufacturing industry to ZDR in the 1980s?	- Answer the question	- Concept check - Check whether learning outcomes are achieved or not	Powerpoint

	- How have the changes in Hong Kong's manufacturing industry impacted its economy and society?			

PDF format of ArcGIS story map
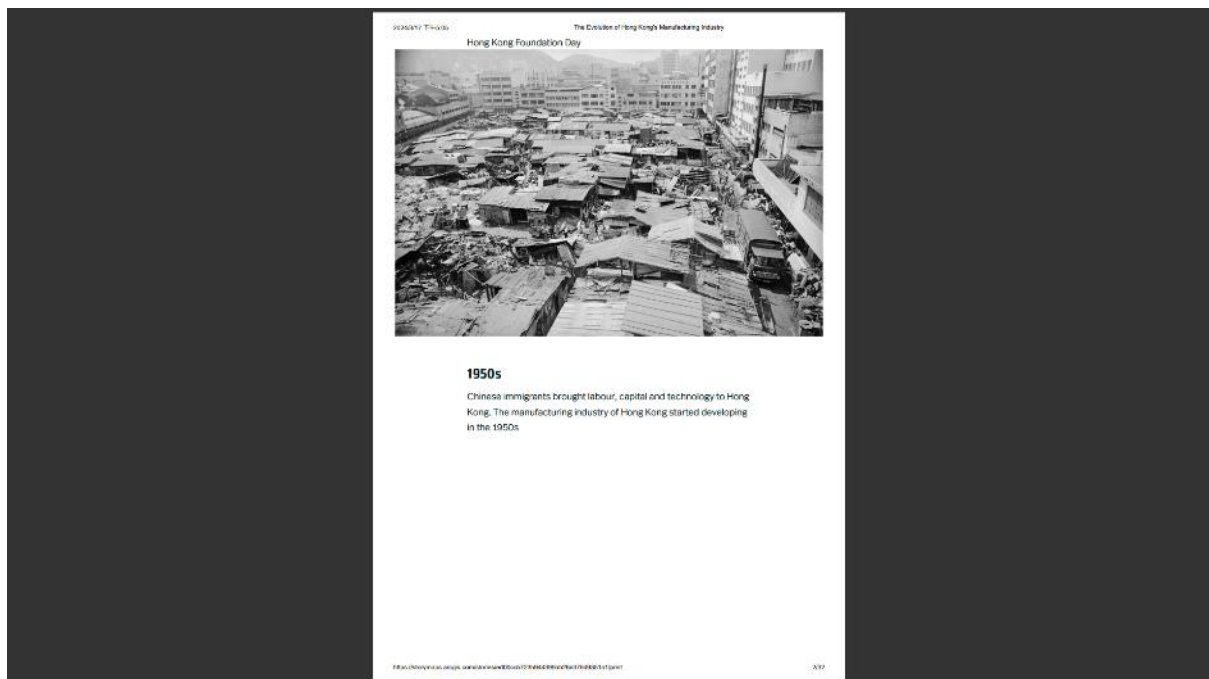
A map showing the distribution of industrial area during 1950s to 1960s

Tsuen Wan 1950

The origins of Hong Kong's light and labor-intensive industries in 1950s to 1960s

(1)

64
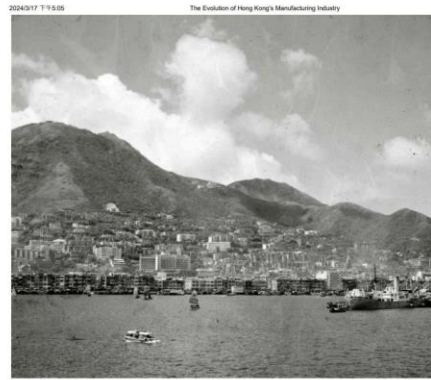
The small factories of **textile** and **plastics industries** were found along both sides of Victoria Harbour.

(2) **Quarry Bay**
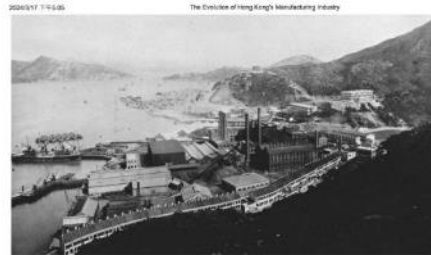
This photo shows some factories in Quarry Bay in the 1950s. Based on your knowledge of locational factors and this photographic evidence, what are the advantages of locating factories in a coastal area?

(3) **Tsuen Wan**

65

Nam Fung Textiles Company, specializing in textile production, is one of the largest company in Hong Kong. The company has played a pivotal role in the textile industry's development.

④

⑤

1960s to mid-1970s

After industrialization, urban areas became crowded, leading to the
expansion of industrial areas into the urban fringe, where many

multi-storey factory buildings were constructed.
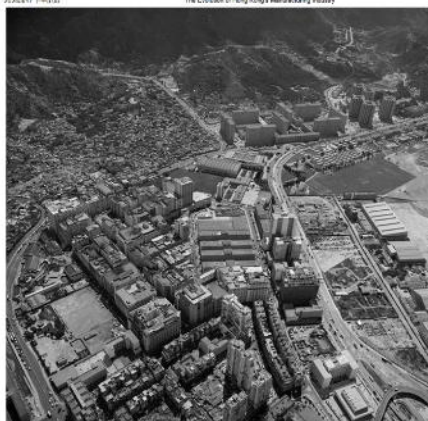

(1) San Po Kong

67

San Po Kong is one of the most famous industrial area in Hong Kong for its textile and garment industry.

2　**Kwai Chung**

Oriental Pacific Mills (東亞太平) – the Largest Wool Textile Producer in HK

Why the industrial area were expanded to the urban fringe ? How the locational factors affect the location?
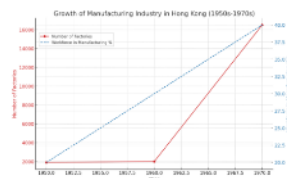

Toys, watches and clocks, and electronics also developed rapidly

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香港故事[第19期] - 潮出名堂

Growth of Manufacturing Industry in Hong Kong (1950s-1970s)

The manufacturing industry employed half of the working population

Mid-1970s to mid-1990s

As industrial activities in both urban areas and the urban fringe increased, Hong Kong's territory became increasingly congested. To address this issue, the government constructed industrial zones and estates in new towns, leading to the redistribution of industrial activities to the New Territories.

The industrial area with larger space and lower rent are provided in New territories

1　Tai Po industrial estate

Different company of food processing industry set up their factories in Tai Po industrial estate.

② **Fo Tan industrial area**

"There is a concentration of machinery manufacturing businesses in this industrial area, making it a hub for the production and development of various machinery and equipment. These include drills, saws, components used in industrial machines, printed circuit boards, connectors, and labeling machines for the food industry."

Late 1990s to present

The government supports the development of hig-tech industries, such as: Information and communciation technology, biotechnology and artificial intelligence (AI)

Earthstar Geographics | Source: Airbus,USGS,NGA,NASA,CGIAR,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and ...   Powered by Esri

1 **Science Park**

There are differnet industry locating in Hong Kong Science Park such as biotechnology, electronics, green technology, and information and communications technology (ICT).

2 **Cyberport**

Cyberport is a digital community and business park in Hong Kong, which focuses on nurturing ICT, digital entertainment, fintech, and smart living industries.

Distribution

Earthstar Geographics   2 mi   Powered by Esri

Red: 1950s, Green: 1960s to mid-1970s, Blue: Mid-1970s to mid-1980s, Purple: Late 1980s to present

Timeline

72

1870

Several production activities of local manufacturing industries had been recorded such as manufacturing of wooden ship, rope.

1930

Chinese capitalists from Shanghai, and Guangzhou came to Hong Kong to establish factories and introduce modern industrial business models, promoting the development of local industries such as weaving, rubber shoes, flashlights, batteries, and others.

1941

Local factories had been confiscated and destroyed due to war

1950

A large number of immigrants arrived in Hong Kong. This promoted the development of Hong Kong's manufacturing industry in different ways.For example, more than 30 cotton spinning industrialists from Jiangsu and Zhejiang came to Hong Kong, transplanting advanced machinery, abundant funds and modern management techniques to promote post-war cotton spinning, weaving, and garment making in Hong Kong. industrial production.

1960s to mid-1970s

Many American and Japanese companies came to Hong Kong to set up factories to produce televisions, communication equipment. Oversea chemical companies supplied plastic to Hong Kong to produce plastic toys, plastic flowers, plastic supplies. At the same time, Switzerland and Germany relaxed export restrictions on watch movements, and Hong Kong's finished watch assembly industry was born, which also promoted the production of watch straps, watch cases and other accessories.

Peak: 1970s

Hong Kong's industry is mainly export-oriented light industry. In the late 1950s, as the European and American markets gradually opened up, Southeast Asian countries adopted protectionist policies in order to develop local industries. Hong Kong manufacturers turned to foreign companies to contact European and American customers. In the mid-1960s, the United States was Hong Kong's largest export market. Toys, clothes, plastic flowers, and wigs were the main products exported to the United States.

Mid-1970s to mid-1990s

The population expanded, land was scarce, and land prices in urban areas were high. Under new town policy, the government redistribute industrial area to the New Territories. For example, the Tai Po Industrial Estate and Yuen Long Industrial Estate were completed. Due to its advantages such as low land prices, convenient transportation, and proximity to labor, various types of factories are attracted to move in.

1980

What happen ?

Late 1990s

The government support the development of high-tech industries.

Present

Hong Kong's manufacturing industry used to be really strong, especially in making clothes and textiles. But the sceneario changed after 1980. Nowadays, there are not as many factories in Hong Kong, and the city relies more on businesses like tourism and finance. The manufacturing industry in Hong Kong has gone down a lot

1980s Indsutrial relocation

Many manufacturers have relocated their factories from Hong Kong to cities in the **Zhujiang Delta Region.**

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1   Shenzhen

2   Dongguan

3   Zhuhai

4   Guangzhou

5   Foshan

6   Qingyuan

"Front shop, Back factory" 前店後廠

Before 1980:

Single-point production was adopted. Both the headquarters and factories were located in Hong Kong

---

After 1980:
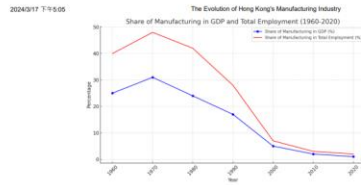
Multi-point production were adopted.

The headquarters in Hong Kong: Management, product design, marketing and logistics.

ZDR: **Production, assembling** and **packaging**

Decline in importance

76

Share of Manufacturing in GDP and Total Employment (1960-2020)

最出獅陽 第一集 - 半個世紀的獅傲(香港製造業總覽)(2003)

Push and Pull factor

Push factors= unfavourable factors motivate industries to leave

Pull factors= favourable factors encourage industries to move in.

---

1. Wage

- Rising wages in Hong Kong
- Increased in **production** cost
- Large population in ZDR
- Provide an abundant suppy of **cheap** labour

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2. Rent

- Land supply in Hong Kong was **limited**

- **lower** rents

- Difficult to expand the **scale** of production in multi-storey buildings

- Low-lying relief in ZDR

- **Extensive flat** land at **lower** rent were provided

- Build **larger** factories at a **lower** cost

3. Government policy

- Hong Kong adopted **non-intervention** policy

- Manufacturing industry lack support and incentives

- Chinese government set up **Special economic zone** in

- **Shenzhen** where economic reform was carried out in 1978

- Incentives offered: Lower tax rate, discounted rents, 5 year interest-free loans

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4. Pollution control

- Hong Kong set up **strict** pollution control policies in 1980, such as the compulsory installation of sewage facilities

- **Raise** production cost

- Pollution control was **loose** in ZDR

- Sewage facilities and other environmental protection measures were not required.

- Production cost were much **higher**

Chapter 5: Global Shift of Manufacturing Industry
Unit 2 What is the manufacturing industry of Hong Kong like
Lesson worksheet

Name: _____   Date: _____

Class: _____

2.1 What is the manufacturing industry of Hong Kong like?

1. Characteristics

● The manufacturing industry of Hong Kong is mainly _____ and _____. Most of them were small in scale, and their products were mainly for export.

2. Stages of development

Stage 1: _____

Major Manufacturing activity	Location
● _____and _____ industries ● _____ immigrants brought labour, capital and technology to Hong Kong	● _____ factories were found along both sides of _____ ● For example, _____ and _____

a) Based on your knowledge of locational factors, what are the advantages of locating a factory alongside Victoria Harbour?

_____

_

_____

_

80

Stage 2: _____

Major Manufacturing activity	Location
● _____, _____, _____, _____ and _____ industries	● _____ were built on the urban fringe ● For example, Kwun Tong and San Po Kong

Growth of Manufacturing Industry in Hong Kong (1950s-1970s)
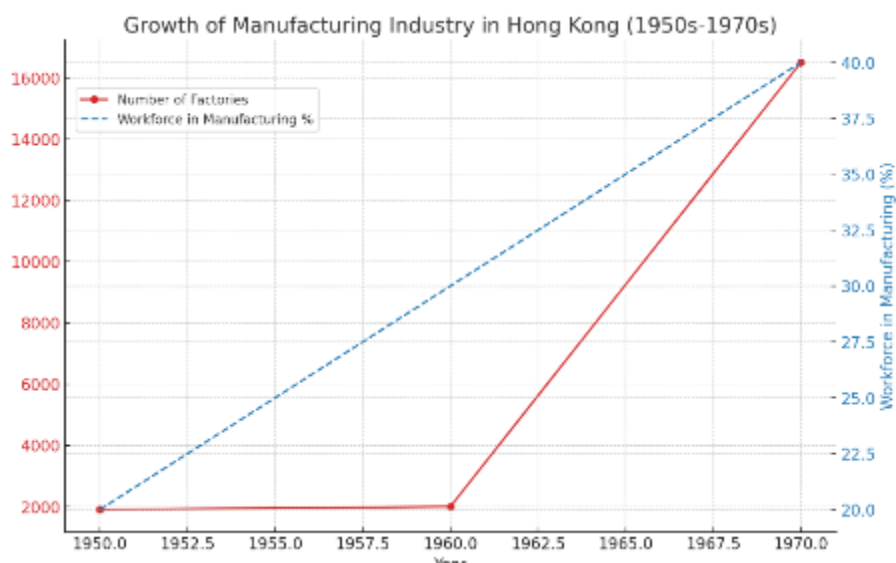
b) Can you describe the trends in the number of factories and the workforce employed in manufacturing?

_____

_____

Stage 3: _____

Major Manufacturing activity	Location
● _____ ● _____ ● _____	● _____ and _____ are built in new towns ● For example: _____, _____

c) What are the potential advantages of locating a factory in the New Territories?

_____

_____

<div align="center">Stage 4: _____</div>

Major Manufacturing activity	Location
● _____ industries ● _____, _____, _____	● _____ and _____ were built close to _____

2.2　How has the manufacturing industry of Hong Kong changed since the 1980s?

1. Introduction
● The manufacturing industry of Hong Kong started developing in the 1950s and peaked in the 1970s.

2. Industrial relocation
● Since the 1980s, many manufacturers have relocated their factories from Hong Kong to cities in the _____

● For example: _____, _____, _____, _____, _ _____, _____

3. Change in Production mode
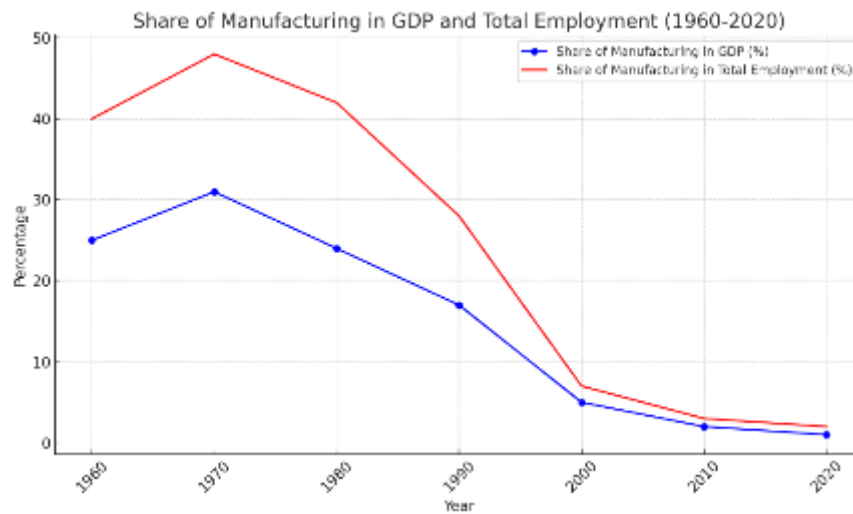
a) Before 1980: _____

The _____ and _____ were located in the same place.

b) After 1980: _____

- The headquarters in Hong Kong were responsible for _____, _____, _____ and _____

- Processes such as _____, _____ and _____ were carried out in factories in the _____

- Also known as _____

4. Decline in importance

Share of Manufacturing in GDP and Total Employment (1960-2020)

a) Describe the changes in the share of manufacturing in GDP and total employment between 1960 and 2020.

_____

_____

**2.3 What were the push and pull factors that caused industrial relocation?**

1. _____	● Rising wages In Hong Kong
	⇨ Increased in _____ cost
- The salary of one Hong Kong worker: $5520 hkd/ month	● Large population in ZDR
- The salary of one Guangdong worker: $250 hkd/ month	⇨ Provide an abundant supply of _____ labour
2. _____	● Land supply in Hong Kong was _____
	⇨ _____ rents
	⇨ Difficult to expand the _____ of production in multi-storey buildings
	● Low-lying relief in ZDR
	⇨ _____ _____ land at _____ rent were provided
	⇨ Build _____ factories at a

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	_____ cost
3. _____	• Hong Kong adopted _____ policy ⇨ Manufacturing industry lacks support and incentives • Chinese government set up _____ in _____ where economic reform was carried out in 1978 • Incentives offered: Lower tax rate, discounted rents, 5 year interest-free loans
4. Pollution control	• Hong Kong set up _____ pollution control policies in 1980, such as the compulsory installation of sewage facilities ⇨ _____ production costs • Pollution control was _____ in ZDR ⇨ Sewage facilities and other environmental protection measures were not required. ⇨ Production cost were much _____
5. Geographic location	• The ZDR is located in _____ proximity to Hong Kong. ⇨ _____ for manufacturers to travel daily to the ZDR to monitor the production processes • Two places share similar languages and cultures, which make

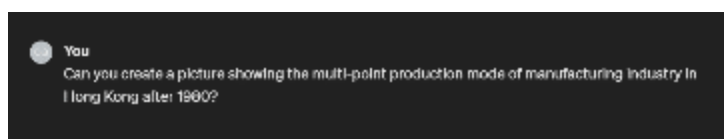|	
	management _____

AI-generated images to show push and pull factors of industrial relocation

The below images are generated by AI for lesson discussion base on the characteristics in the images.

1. Picture describing single point production (Open AI, 2024):
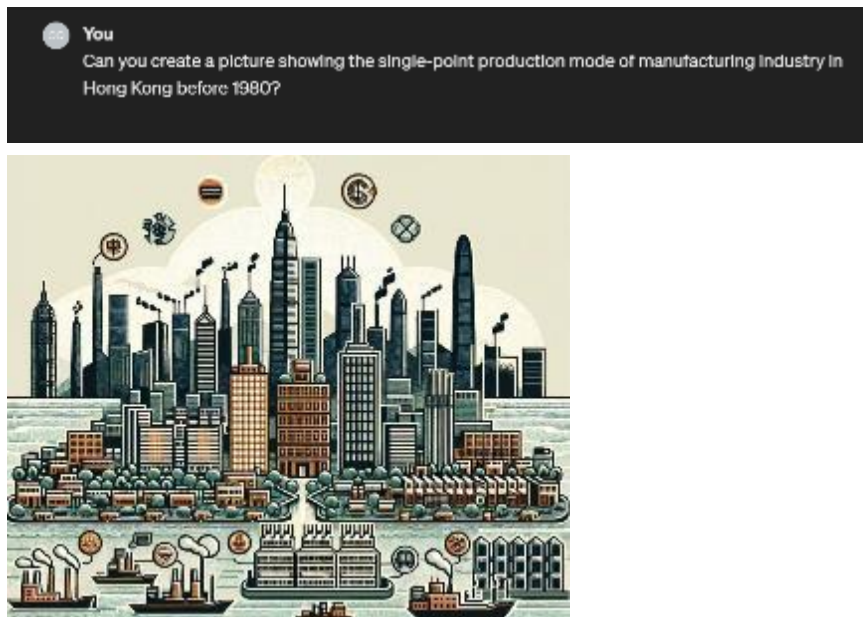
2.   Picture describing multiple point production

(Open AI, 2024):

86

3. Picture describing difference in wage in Hong Kong and Zhujiang Delta

You

Can you create a picture showing that rising wage in Hong Kong and cheaper labour cost in Zhujiang Delta which cause industrial relocation?
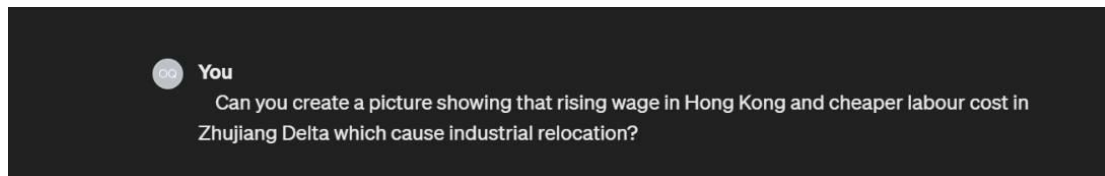
(Open AI, 2024):

4. Picture describing difference in land rent in Hong Kong and Zhujiang Delta

You

Can you create a picture showing that rising land rent in Hong Kong and lower rent in Zhujiang Delta which cause industrial relocation?
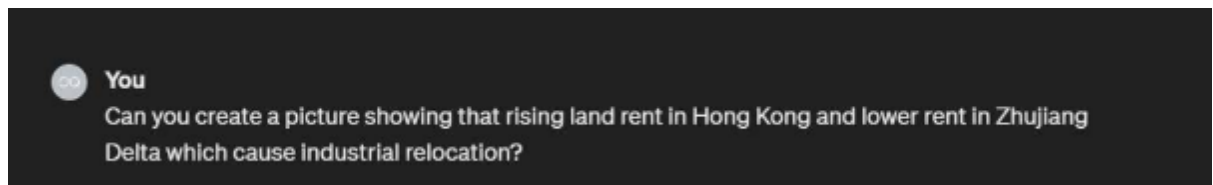
(Open AI, 2024):

5. Picture describing the difference in support of government policy in Zhujiang Delta

You
Can you create a picture showing that lack of government policy in Hong Kong and a lot government support in Zhujiang Delta which cause industrial relocation?
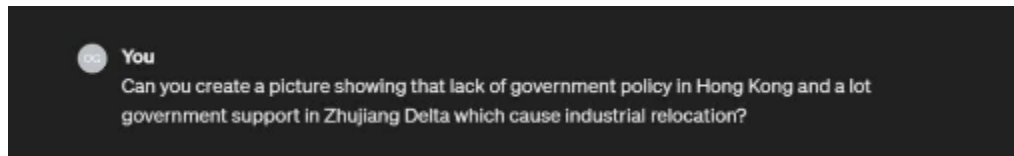
(Open AI, 2024):

6. Picture describing the difference in pollution control in Hong Kong and Zhujiang Delta

You
Can you create a picture showing that loose pollution in Hong Kong and strict pollution control in Zhujiang Delta which cause industrial relocation?
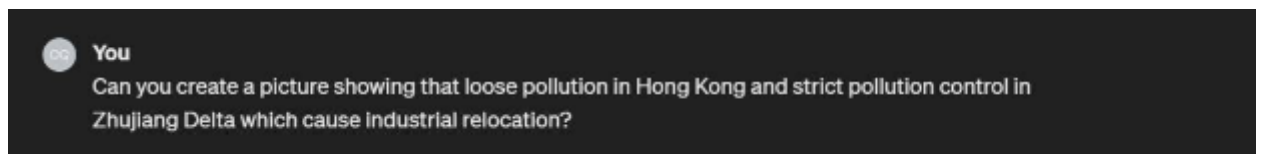
(Open AI, 2024):

7. Picture describing convenient geographic location of Zhujiang Delta

You
Can you create a picture showing that convenient geographic location between Hong Kong and Zhujiang Delta which cause industrial relocation?
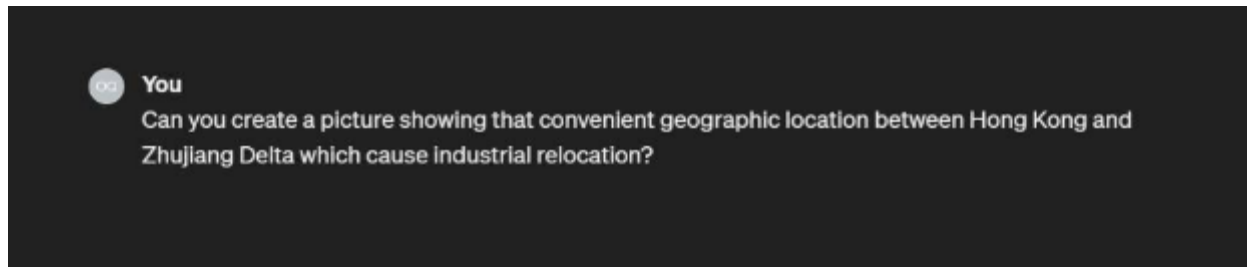
(Open AI, 2024):

Appendix 4: Lesson 4 teaching and learning resources

<u>Lesson plan of lesson 4</u>

上課日期 Date of lesson: 20/2

上課時間 Time : 13:55-15:05

主題 Topic: Location of industrial belt and locational factor

Prior knowledge 學生先備知識：

1. Students may know some countries are famous industrial centers, such as Japan 2. Students have learned the factors that affect industrial locations

學習目標 Learning objectives

1. Describe the distribution of industrial belts in the world 2. Explain how the locational factor favors the formation of the industrial belt

教學資源/工具/設備 Learning resources：Google Earth, PowerPoint, Textbook

Link of lesson 4 google earth virtual fieldtrip:

https://earth.google.com/earth/d/1Zw_gg4ABHBYH4mlrfA67uf_kfWJy_SCc?usp=sharing

Link of lesson 4 Powerpoint:

https://docs.google.com/presentation/d/1eWTvmwhPwl-MIJZSyLKRSlE3pnmQNhVN/edit?usp=drive_link&ouid=111854117720062662955&rtpof=true&sd=true

時間 Time	教學重點/內容 Teaching Content	學生任務 Students' task	學習重點 Key learning	Resource 教學資源
5	Introduction of this lesson : - Teacher: Previously, we have learned about the basic knowledge of industry and the manufacturing industry in Hong Kong. In this lesson, we will start leaving Hong Kong to learn something about the world.	- Share prior knowledge about industrial activities in different activities - Describe the distribution of the major global industrial region - Watch the video about latitude	- Check prior knowledge - Introduce the topic of this lesson	- Powerpoint

	- Question: Do you know any country that is famous for its industrial activities? - Show a map of the major global industrial region - Question: Can you discuss the distribution of the major global industrial region? You have one minute discussion time with your neighbor - Describe the distribution of the industrial belt: mid-latitudes of the northern hemisphere	- Think about which type of industry is more popular in the major industrial region, for example: heavy industry is related to the development of a city (building)	

	- Explain latitude by watching a video: https://www.youtube.com/watch?v=FEKFRV29Sk4 - Separated by the ocean: discontinuous - Question: Which type of industry is more popular in these regions? Heavy industries and light industries? - Heavy industries: such as iron and steel		

| 20 | Three major regions in the industrial belt

- Introduce Google Earth virtual field trip and its function (street view, 2D, 3D, how to control the screen)
- Ask students to scan the QR code and go to the web page of the virtual field trip

- 15 minutes Groupwork: two students per group, follow the instructions in the Google Earth. Finish p.2 of the worksheet step by step

- Covered content: History of the Industrial Revolution (first took place in the UK), | - Finish worksheet p.2 by conducting the virtual field trip on Google Earth

- Discuss with classmates | - Develop student's self-learning capability by using an inquiry-based virtual field | - Google Earth
- Worksheet |

	three major industrial regions (Europe, East Asia, and North America) - Finish worksheet p.2 by conducting the virtual field trip on Google Earth			
10	Recap and check the answer - Show the map of the major industrial region - Question: How is the beginning of industrial activity? (Industrial Revolution in the UK) - Spread to other parts of Europe: Ruhr Region in	- Check the answer of worksheet p.2	- Describe the distribution of industrial belt in the world: - - Traditional industrial regions are found in the mid-latitudes of the northern hemisphere. They form an industrial belt that spans Europe, East Asia, and North America	- Powerpoint - Google Earth - Worksheet

	Germany, St. Petersburg in Russia, Moscow - East Asia: Tokyo and Nagoya in Japan, Seoul and Busan in Korea, and the Three Northeast Provinces in China - Simply introduce Three Northeast Provinces (Heilongjiang, Jilin and Liaoning) - North America: the Great Lake Region - Simply introduce the Great Lake Region (What are the five lakes and the major cities)		

	- Well-known for the car industry - Link to the next part of the lesson: A case study of the car-making industry in the Great Lakes Region			
5	Transit to the next part of the lesson: locational factor - Teacher: We have learned the factors that affect industrial locations in the previous lesson. In the following part of the lesson, we will examine how the locational factors favor the formation of the industrial belt	- Raise a question to any unclear part - Understand the next part of the lesson	- Connect the first part and second parts of the lesson	- Powerpoint

| 15 | Locational factor

- Continue Google Earth virtual field trip

- 15 minutes Groupwork: two students per group, follow the instructions in the Google Earth. Finish p.3-5 of the worksheet step by step

- Covered content: Physical factor (land, water, natural resources, energy), Human factor (transport, markets, capital, labor, government policy), similar types of industries clustered in Detroit | - Finish p.3-5 of the worksheet
- Discuss with classmates | - Develop student's self-learning capability by using an inquiry-based virtual field | - Google Earth
- Worksheet |

10	Recap and check the answer	- Check the answer	- Explain how the locational factor favors the formation of the industrial belt	- Powerpoint
				- Worksheet
	- Landscape: flat and large area of flat area	- Answer question		
	- Water: Rivers and lakes supply water	- Raise questions about any unclear part		
	- Main natural resources: Iron range and coalfield	-		
	- Power plant: provide stable energy supply			
	- Well-connected transport network: highway, railway, port			
	- Big cities provide markets, capital, labor			

	- Government policy: watch a video on NBC News about policies that support industrial development - Show the worksheet answer			
5	Summarize the content of this lesson Key questions: - Where are the traditional industrial regions located? - The industrial belt spans to which three regions? - What are the locational	- Answer the question	- Concept check - Check whether learning outcomes are achieved or not	Powerpoint

	factors that favor the formation of the industrial belt?		

Chapter 5: Global Shift of Manufacturing Industry
Unit 3 Global Shift of manufacturing
Lesson worksheet

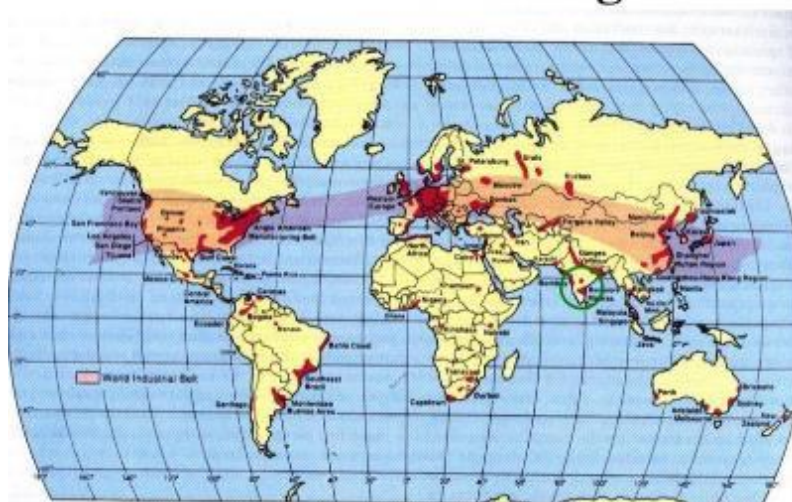Name: _____   Date: _____

Class: _____

3.1 Where is the industrial belt in the world?

a) INDUSTRIAL BELT

- The industrial belt is where traditional industrial regions cluster.

- These regions are mainly found in the **low**/**mid**/**high** latitudes of the **Northern**/ **Southern** hemisphere. They form a **continuous**/ **discontinuous** industrial belt.

b) TYPES OF INDUSTRY IN THE INDUSTRIAL BELT

- _____ industries: Such as iron and steel
- _____ industries: Such as textile

_____

In the following part of the worksheet, we will use Google Earth to explore the industrial belt around the world. Click this link and get ready to dive into a digital journey :
https://earth.google.com/earth/d/1Zw_gg4ABHBYH4mlrfA67uf_kfWJy_SCc?usp=sharing

Let's start our adventure!

c) WHERE HAS THE INDUSTRIAL BELT EXPANDED?

● The industrial belt spans three regions. They are:

1. _____

● The _____ _____ is the birthplace of the Industrial Revolution.

● _____ industry and the _____ and _____ industries are thrived.

● After the Industrial Revolution, industrial activities then spread to other parts of Europe,

such as the _____ Region in Germany.

● In Eastern Europe, industrial activities clustered in St. Petersburg in Russia before

spreading to Moscow and Ukraine.

2. _____

● _____ and _____ are two traditional centres in Japan

● _____ and Seoul are two traditional centres in _____

● The _____ _____ provinces (Heilongjiang, Jilin and Liaoning) and the

_____-_____ Region in _____.

● _____ industries are developed in the above areas.

3. _____

● The _____ _____ Region is the famous industrial centre

● _____, _____ and _____ are located in the Great Lake

Region

● It is known for its _____ and _____ as well as car-making industries

Appendix 5: Lesson 5 teaching and learning resources

Lesson plan of lesson 5

上課日期 Date of lesson: 27/2

上課時間 Time : 13:55-15:05

主題 Topic: Agglomeration economies and data collection

Prior knowledge 學生先備知識：

1. Students may know some countries are famous industrial centers, such as Japan
2. Students have learned the factors that affect industrial locations

學習目標 Learning objectives

1. Define agglomeration economies
2. Evaluate the benefits of agglomeration economies

教學資源/工具/設備 Learning resources：Google Earth, PowerPoint, Textbook

Link of lesson 5 google earth virtual fieldtrip:

https://earth.google.com/earth/d/1T-85LEI_Go19XzGtqKS5ZtGzBIbh1vL2?usp=sharing

Link of lesson 5 Powerpoint:

https://docs.google.com/presentation/d/1PK9s-
PXqQptNeFYgIdVpGaRM_zGTs4YT/edit?usp=drive_link&ouid=111854117720062662955&rtpof=true&sd=true

時間 Time	教學重點/內容 Teaching Content	學生任務 Students' task	學習重點 Key learning	Resource 教學資源
5	Recap the last lesson: Question: - Where are the traditional industrial regions located? - The industrial belt spans to which three regions?	- Read textbook p.49-51 to recover the knowledge of the last lesson - Answer the question	- Recap the knowledge of the last lesson	- Powerpoint

	- What are the locational factors that favor the formation of the industrial belt?			
5	Enter Google Earth web page - Explore the other or related industries in Detroit on Google Earth - Examples: steel plant, power plant, car research and development center, bank and insurance company, shipbuilding	- Explore different types of industries in Detroit on Google Earth	- Extend to agglomeration economies by Google Earth	- Powerpoint
10	Define agglomeration economies - When similar or related types of industries cluster in an area, they can enjoy benefits	- Discuss the benefits of agglomeration economies - Write down the thoughts about the	- Definition of agglomeration economies - Benefits of agglomeration economies	- Powerpoint

	known as agglomeration economies. - Discuss question: What are the possible benefits of agglomeration economies? - Choose the answer on the blackboard and invite students to explain their answer	advantages of industrial agglomeration on the blackboard		
10	Explain the benefits of agglomeration economies - Question: What kind of infrastructure can be shared by different industries together?	- Answer the question - Copy the notes and finish worksheet p.6	- Evaluate the benefits of agglomeration economies	- Powerpoint - Worksheet

	- Example: transport, power supply facilities - Agglomeration economies can attract government to improve the infrastructure - Question: We know that there are car-making industries, and shipbuilding steel industries in Detroit. Think about the benefits from the perspective of the source of raw materials - Agglomeration economies can save production cost - Question: Why is there the		

	presence of banks and insurance companies in Detroit?		
	- Agglomeration economies can bring supporting services in		
	- Question: In terms of labor, what benefits can be brought from agglomeration economies		
	- Agglomeration economies can provide a wide range of job opportunities, and labor of different skill levels are brought in		

30	Data collection: Post test and survey	- Finish the post test and survey	- Data collection	- Google form
10	Summarize all the content of this lesson Questions: - List out the four major types of industry according to the textbook - Describe the characteristics of the aircraft manufacturing industry by three criteria - What are the human factors when determining the	- Answer the question and ask questions, if any	- Concept check	- Powerpoint

	location of a factory?		
	- What are the physical factors when determining the location of a factory?		
	- How did Hong Kong's manufacturing industry evolve from the 1950s to the present, and what were the key factors driving these changes?		
	- Where are the traditional industrial regions located?		
	- What are the benefits of the agglomeration economies?		

Chapter 5: Global Shift of Manufacturing Industry
Unit 3 Global Shift of manufacturing
Lesson worksheet

Name: _____   Date: _____

Class: _____

3.2 What are the locational factors that favour the formation of the industrial belt

In the following part of the worksheet, we will keep using Google Earth to explore how the PHYSICAL and HUMAN locational factors favor the development of the car-making industry in the Great Lakes Region, USA.

Click this link and get ready to dive into a digital journey :
https://earth.google.com/earth/d/1T-85LEI_Go19XzGtqKS5ZtGzBIbh1vL2?usp=sharing

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PHYSICAL FACTORS

Step 1: Explore Detroit's landscape surrounding car-making centers

a) While exploring the landscape surrounding car-making centers, examine the area's characteristics.

	Chicago	Detroit
Size of land	Large / Small	Large / Small
Relief of land	Hilly / Flat	Hilly / Flat

b) Consider how these geographical features may influence the location and operations of car-making facilities.

_____

_____

Step 2: Explore the water source in Great Lake Region

a) Identify the name of the possible water sources near the Ford Motor Company in Chicago and the Stellantis Jefferson North Assembly Plant in Detroit.

	Type of the water source	Name of the water source
Chicago	1. 2.	1. 2.
Detroit	1.	1.

b) Importance of water sources

_____ and _____ supply water for industrial activities.

Step 3: Explore the natural resources in the Great Lake Region

a) What are the main natural resources in the Great Lake region?
  ● _____
  ● _____

b) How do rich natural resources contribute to the availability of raw materials and energy resources for car-making industries ?

_____

_____

—

Step 4: Explore raw materials and energy resources for the car-making industry in Detroit

a) What are the benefits of situating car manufacturing plants in close proximity to raw materials? (Consider cost management)

_____

_____

—

b) Power plants provide a **Stable / Unstable** power supply.

_____

HUMAN FACTORS

Step 5: Explore the transport network in the Great Lake Region

a) Identify the three types of transport infrastructures that favor the car-making industry in the Great Lakes Region.

    1. _____
    2. _____
    3. _____

b) What are the advantages of a well-developed road network for the car-making industry? (Consider the logistics and accessibility of goods and services)

    _____

Step 6: Explore markets, and capital in Detroit.
- Big cities like Detroit provide a large consumer market and supporting services like banks and insurance companies.

Step 7: Explore labour in Detroit

a) What are the benefits of locating a factory near residential areas?

    _____

b) How do technical schools and universities contribute to the success of the car-making industry? (Consider the role of higher education and vocational training)

    _____

    _

⇨ Big cities nearby provide _____, _____ and _____ for manufacturing activities.

Step 8: Watch the video about government policy to the car-making industry in Detroit

- Example: The US government invested a significant amount of money to save car companies like General Motors and Chrysler when they were in trouble, preserving many jobs in the process. This assistance helped revitalize the car-making industry, allowing the big three US car companies to become profitable again.

a) What is the role of government policy in the car-making industry?

_____

Step 9: Explore Similar/Related Types of Industries in Detroit

● When similar or related types of industries cluster in an area, they can enjoy benefits known as **agglomeration economies**.

Summary

Physical factors	Human factors
● _____ area of cheap and _____ land ● Access to _____ and _____	● Access to _____, _____ and _____ ● _____ transport networks ● Favourable government _____ ● _____ economies

What are the possible benefits of agglomeration economies?

Even if locational advantages disappear with time, why some industries still remain in the area ?

● This is known as _____

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