Developing and Using Virtual Fieldwork Materials

Ng Tung River

For developing students' fieldwork skills

Geography Teachers' Professional Experience Sharing
Week on Geography Education in Hong Kong (2021)
18-06-2021

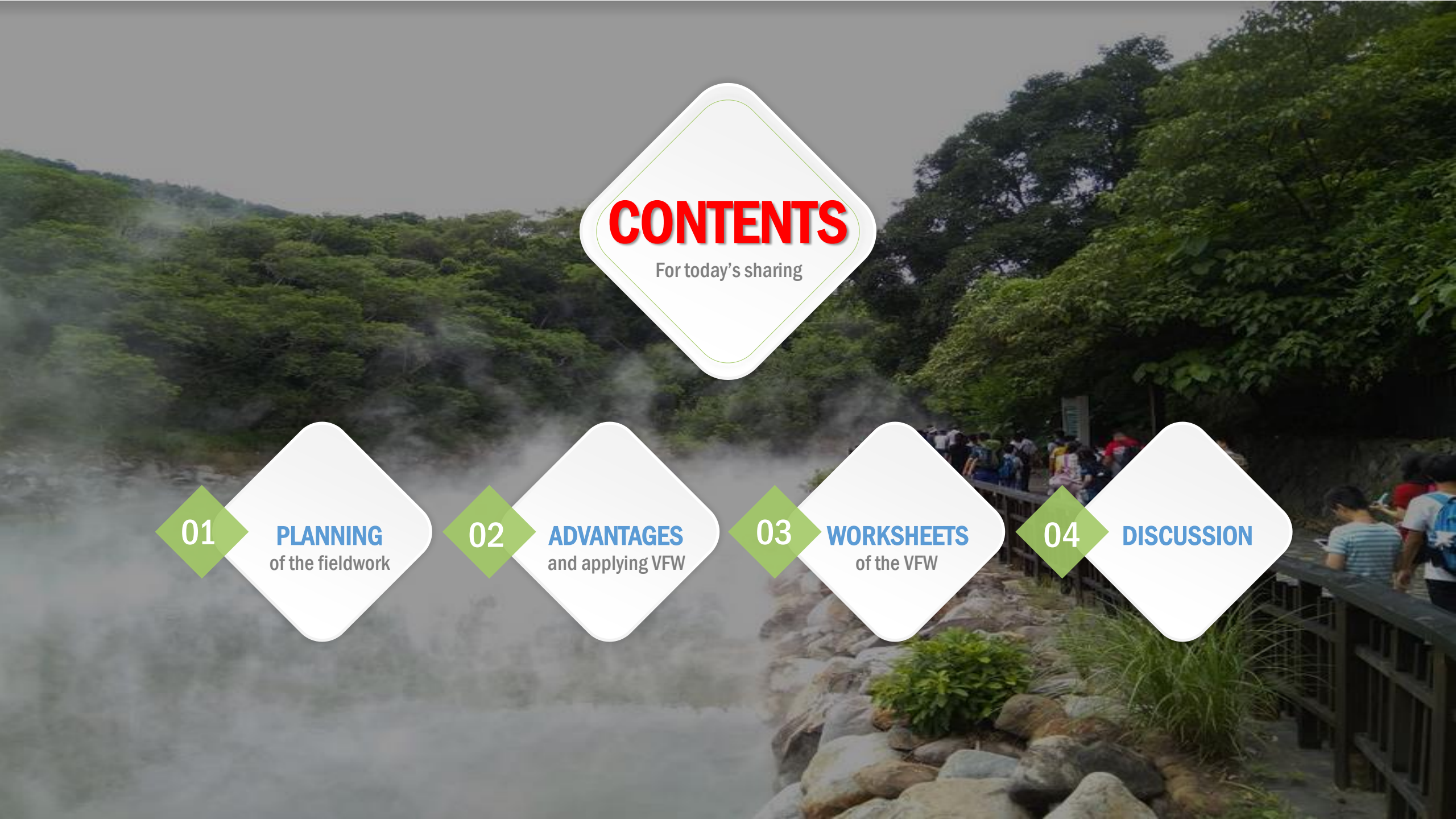
Self-Introduction

Po Leung Kuk Lo Kit Sing (1983) College

- DSE / AL / CE Geography Teacher
- Conducted >30 fieldworks
- Facilitator of e-learning (SS)

Experiential educator

- Field Works / Trips
- Overseas Geography field trips
- Gaming in Learning



CONTENTS

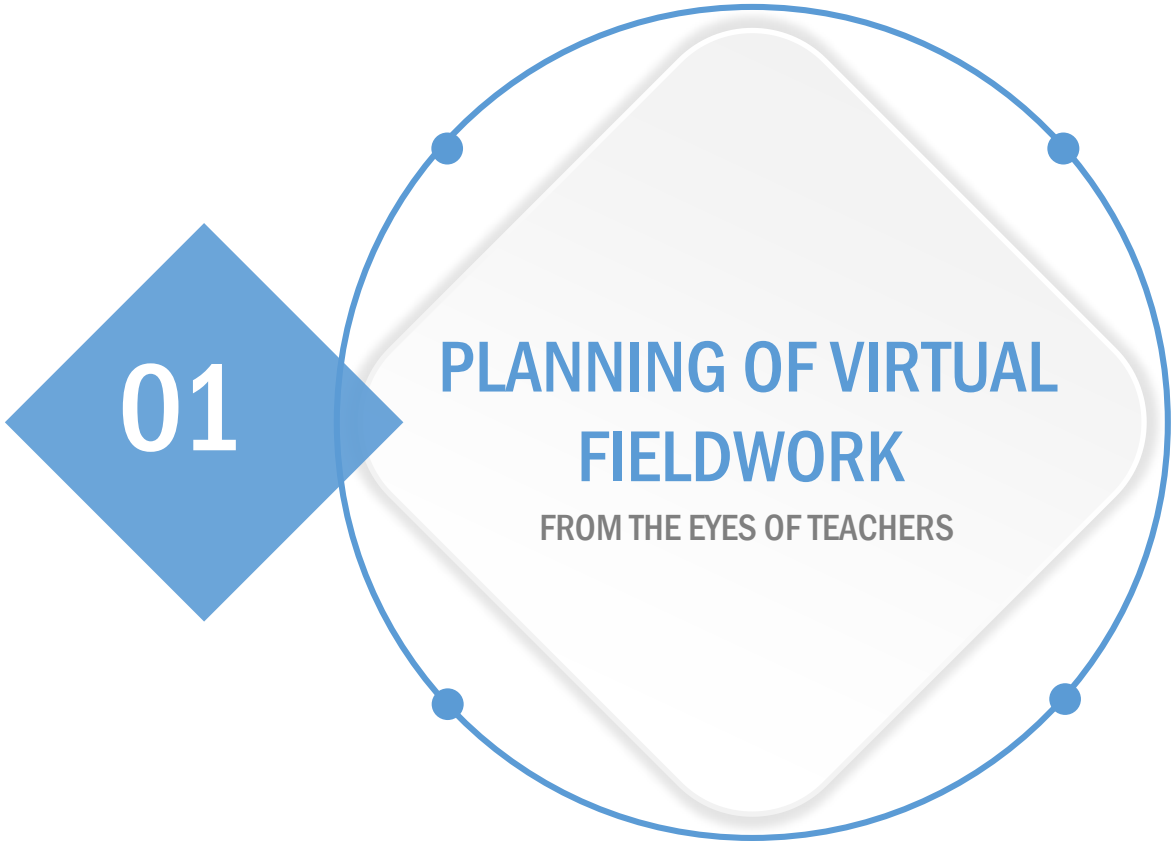
For today's sharing

01 **PLANNING**
of the fieldwork

02 **ADVANTAGES**
and applying VFW

03 **WORKSHEETS**
of the VFW

04 **DISCUSSION**

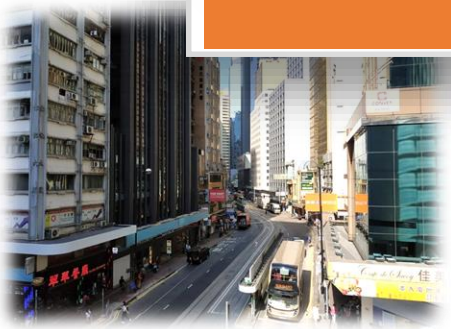

01
PLANNING OF VIRTUAL FIELDWORK
FROM THE EYES OF TEACHERS

Rationale

Rationale for Virtual Fieldwork

- Fieldwork skills are learnt in the field, in the wild and in everyday life…

Before CCA Restrictions



- Teachers led field-work / visits
- Field Centre Programs
- External Services

VS

After CCA Restrictions

- **Insufficient resources / days** to conduct real fieldwork.
- Shortening of usable teaching time.
- **Curriculum needs**: FBQ / Fieldwork skills

Fieldwork Based Assessment (2022)

There is still a genuine need for learning fieldwork skills on the basis of

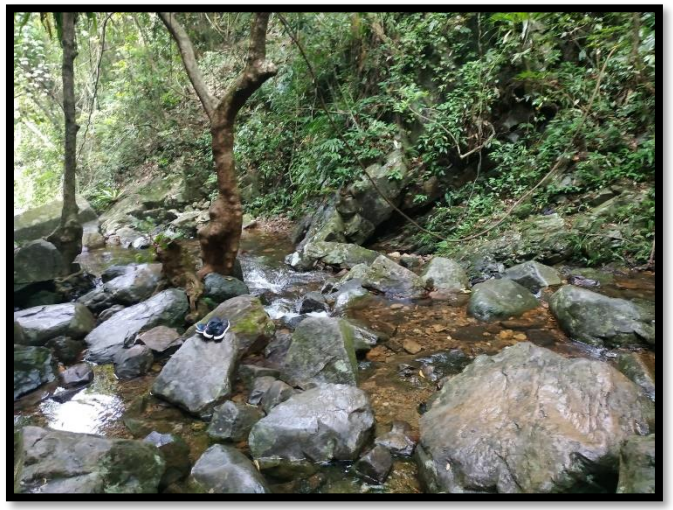
- effective **learning & cognitive development**
- **generic skills** learning
- handling **public assessment**

Why there is a need to use Virtual Fieldwork / Fieldtrip

SHOCKINGLY

Majority of students **NEVER** visit a REAL natural river in real life.

Some believe water comes from **TAPs.**



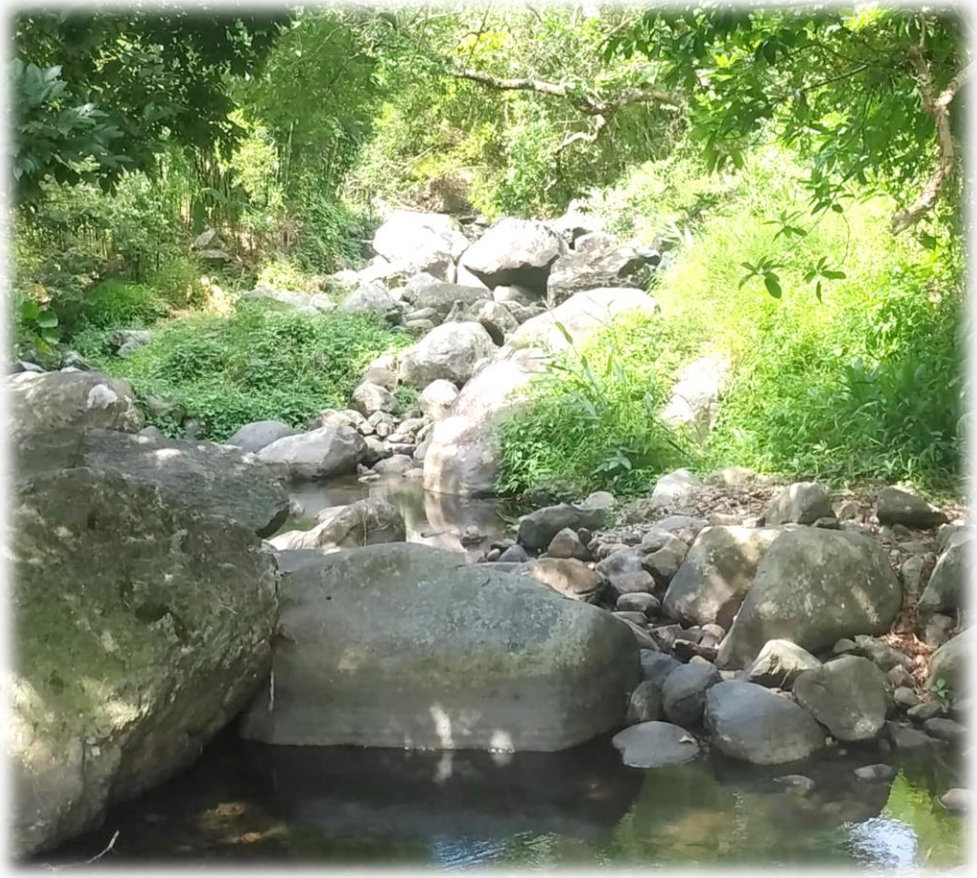
What should students learn about local rivers / drainage basin?

- **River and our environments**
  1. Many tributaries
  2. Mostly short / transacted rivers
  3. Flow through urban areas
  4. Large seasonal variation in discharge
  5. Sharp change in altitude

Conclusion

Rationale

Fieldwork Planning



Where?

- There are so many rivers in Hong Kong.
- Many urban / concealed / dammed channels.

- **Question:**
  - What is the enquiry topic / issue for fieldwork research in fluvial environment?

- Pre-trip preliminary data analysis
  - Safety
  - Available tools / equipment
  - Accessibility
  - Feasibility
  - Data quality

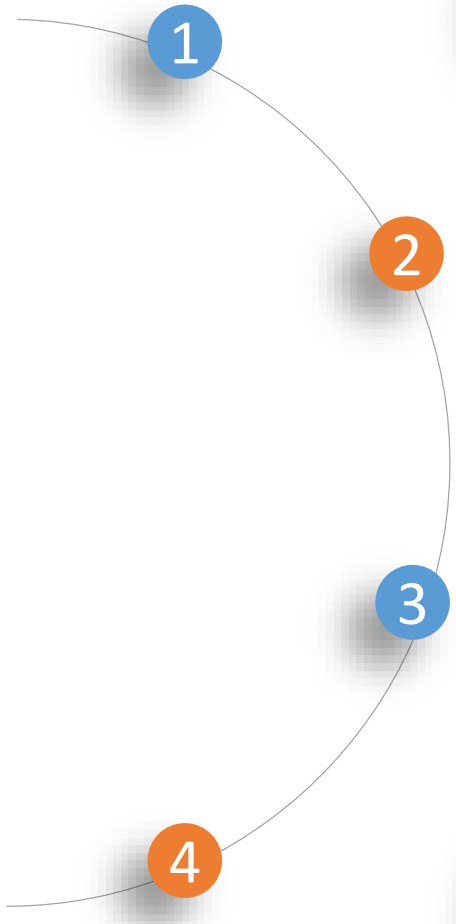
Preparation

The hardship…

From the perspective of geographical concepts

- Source of river?
- Mainstream of river?

What issues / topics are suitable?



Fluvial processes

Testify the changes of discharge / velocity / erosion / deposition / transportation rate etc

Fluvial landform / morphology

Validate whether Hong Kong has various erosional / depositional landforms along river courses.

Rivers and Living Environment

Interview residents / users on the perception of a good / useable river.

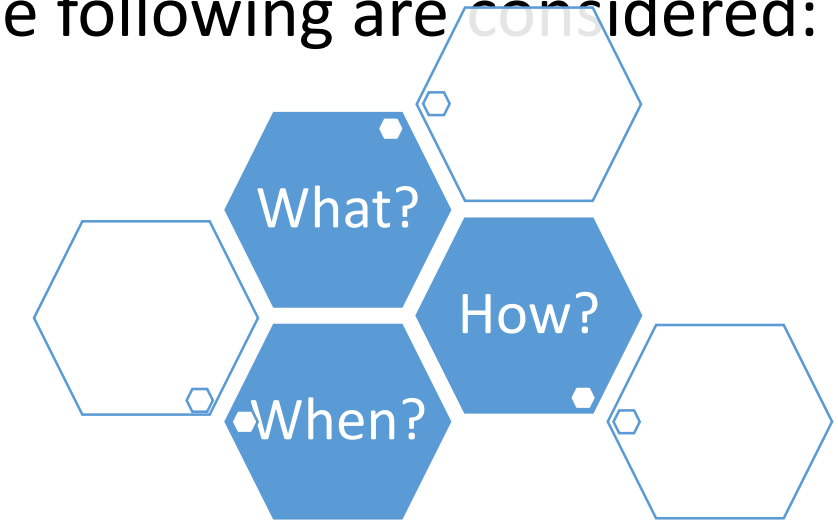
Flood Management

Decide whether the existing flood management is appropriate / needs for extra flood management.

How to take field records?

- **Ng Tung River** is chosen
  - Its large catchment, long river (13km)
  - Relatively natural
  - Relatively accessible by public transport

- Then, the following are considered:



Sampling method

- Appox. equal distance
  - Systematic point sampling
  - Each point is about 1.2 km in distance
  - Capture represented fluvial characteristics & changes along river sections

When I was planning the fieldwork.....

- Upper course
  - Which stream should we record?
  - How can we reach the river?
  - Is it safe / legal to walk in the river?
  - How to deal with pests / weeds?

Taken on 29 January 2021

When I was planning the fieldwork.....

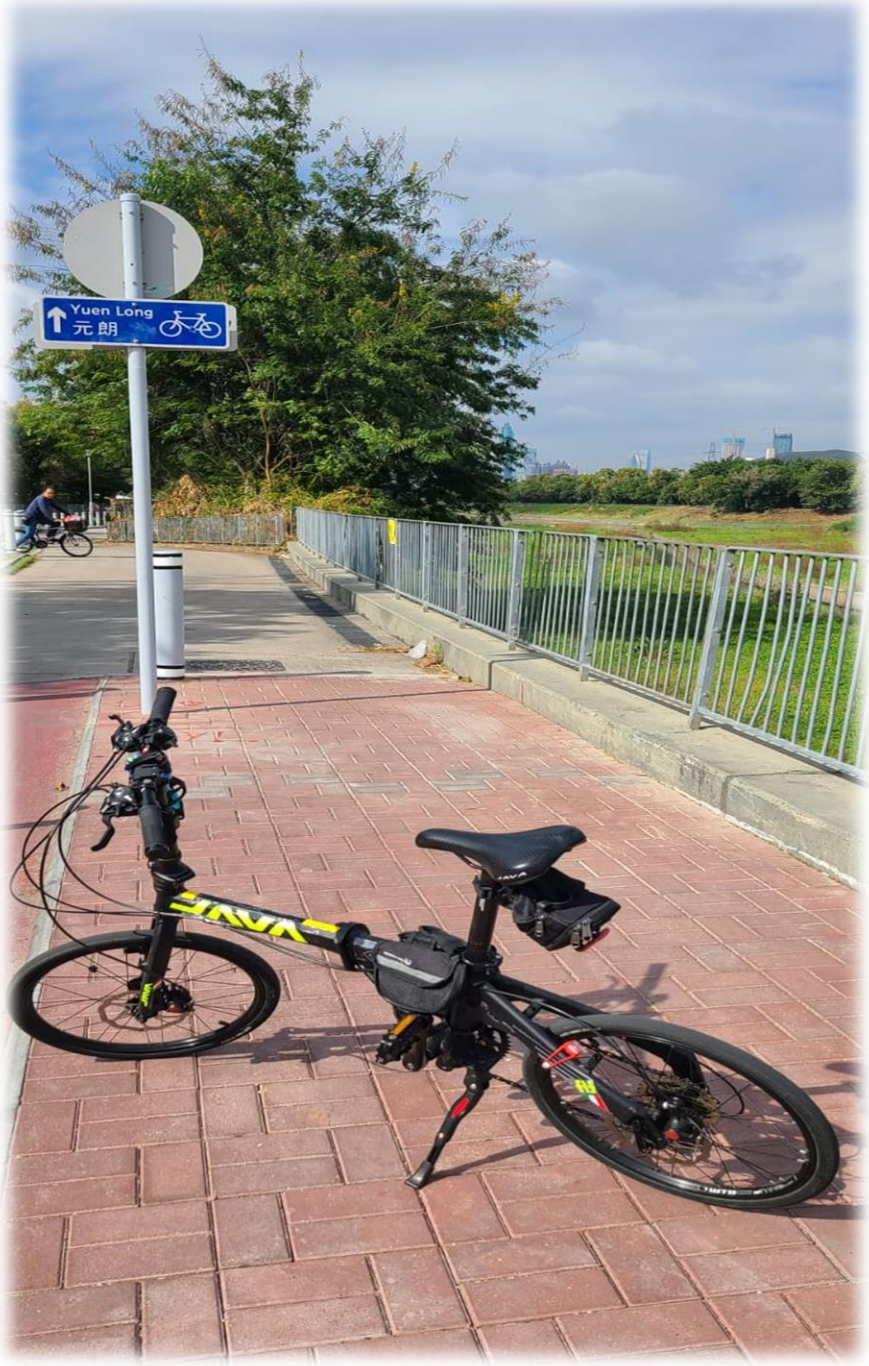
- Lower course
  - How to position the accurate point / ensure data validity?
  - How to log more useable data from the channel?
  - How to take best photo to represent the point?

Taken on 29 January 2021

Rationale

Fieldwork Planning

Field collection



How to prepare for the virtual fieldwork materials?

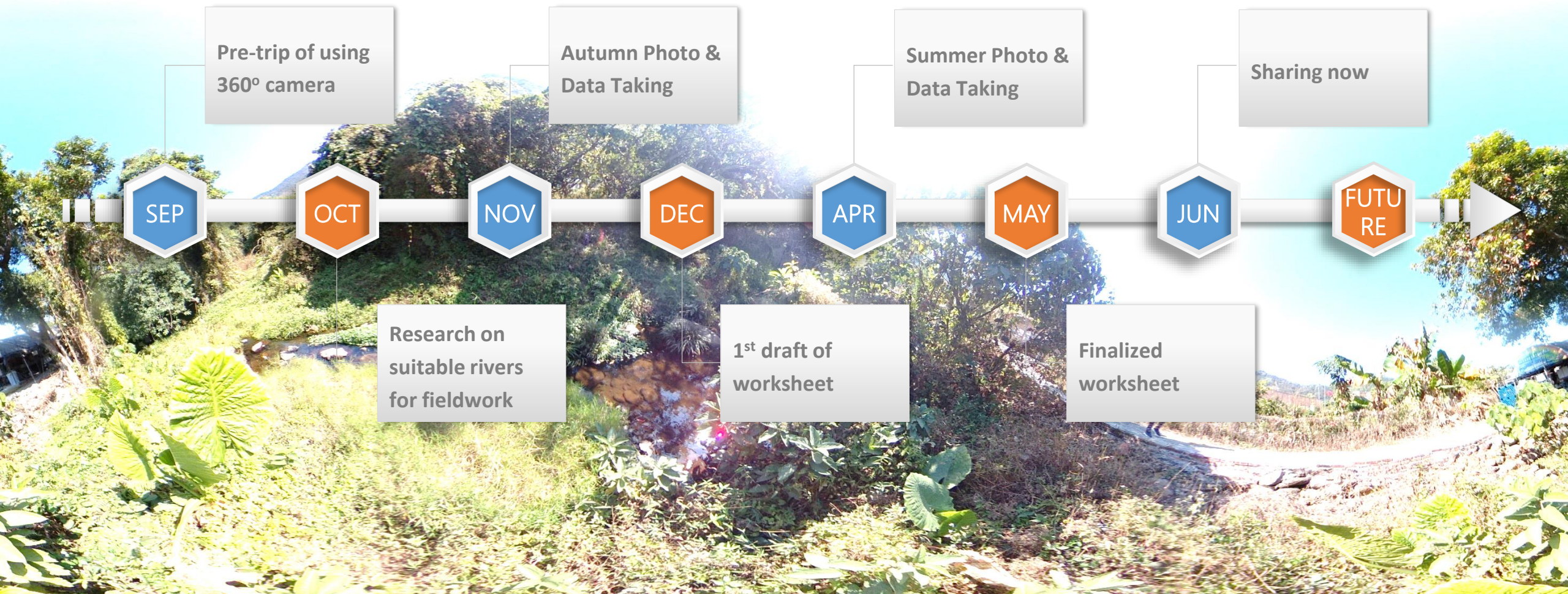
- Using bicycle to travel to field sites in a day.
  - Accurate fluvial characteristics of the day.
  - Some sites are inaccessible by vehicles.
  - Reduce biases.

- Safety concerns
  - Dogs
  - Slopes
  - Pests / Mosquitoes
  - Exposed location
  - Rocky / slippery channel
  - Trespassing private land
  - Lack of mobile signal
  - Exhaustion


Is it safe to conduct a field collection here?


Is it safe to conduct a field collection here?

When?


Pre-trip of using 360° camera
Autumn Photo & Data Taking
Summer Photo & Data Taking
Sharing now
SEP
OCT
NOV
DEC
APR
MAY
JUN
FUTURE
Research on suitable rivers for fieldwork
1st draft of worksheet
Finalized worksheet

02

APPLICAION & ADVANTAGES

OF USING VIRTUAL FIELDWORK

APPs / Software used in this Teaching Sampler

GeoInfo Map

- Map Reading
- Pre-trip Planning

Google Earth (Presentation)

- 3D Authentic
- Virtual Pre-trip

EduVenture VR

- 360º panoramic photos
- Virtual fieldwork (data collection)

Reasons for using 2 different APP / Software

Google Earth (Presentation)

- Can show terrain / map
- Clear understanding of environment
- Easy to navigate

- Less details / blurred view
- Service may be suspended

- Best for
  - Understanding the field sites
  - Pre-Trip

EduVenture VR

- Authentic view
- Can show videos / audios
  - Guess the velocity, noise level etc
- Can set questions / tasks
- More details (add data set)

- Need to install APP / download much data
- Need specific tools
  - e.g. VR Google / VR Headset

- Best for
  - Observing and recording

Using Virtual fieldwork….
From the Fieldwork Perspective

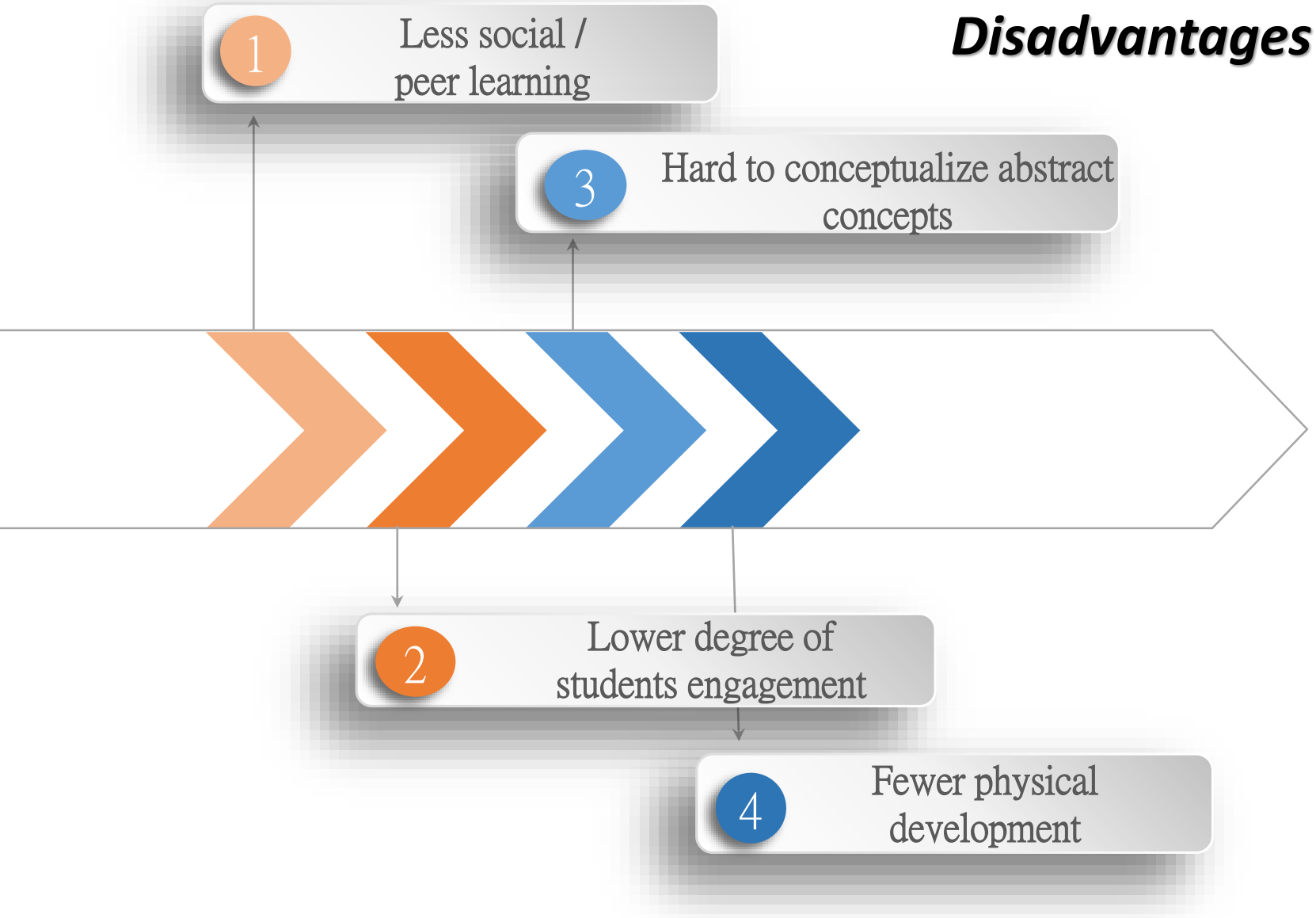
Advantages

- All weather
- Easy to monitor discipline
- Safer
- Lower costs
- Time-saving
- Easier to cater SENs / diversity
- Reliable (data wont change)

Disadvantages

- Objective
- Little training on using authentic field tools / equipment
  - Man-induced errors
- Lower validity of data collected
  - Mostly second-hand data
- Less flexible research design
  - fixe route / tasks
  - restricted to data collected

From the Students' Development Perspective



Disadvantages of virtual fieldwork

Adolescent loves to play and curious about new environment.

- During authentic fieldwork, it provides space for **cultivating creativity, problem-solving** and **effective communications** with other classmates.
- Cannot control & give **instant feedback.**

From the Fieldwork Skills Perspective

Comparison

- Measurement
- Observation
- Sketching
- Interview / surveys

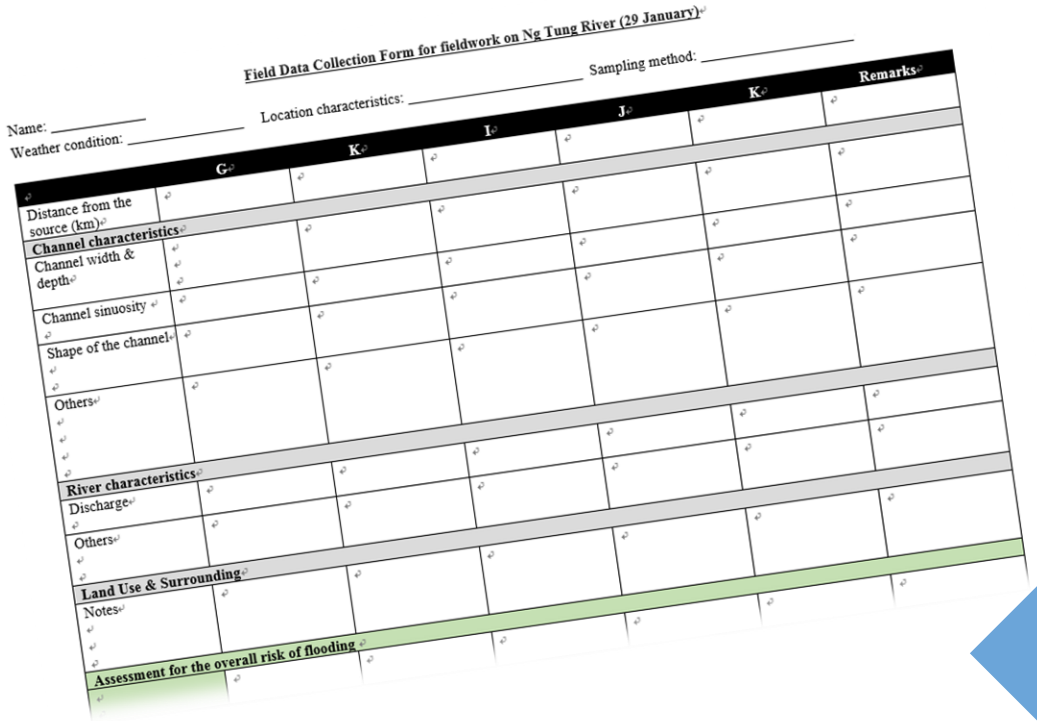
01

Authentic fieldwork

Virtual fieldwork

02

- Observation
- Sketching
- Counting
- Summarizing



Field Data Collection Form for fieldwork on Ng Tung River (29 January)

Name: _____ Location characteristics: _____ Sampling method: _____

Weather condition: _____

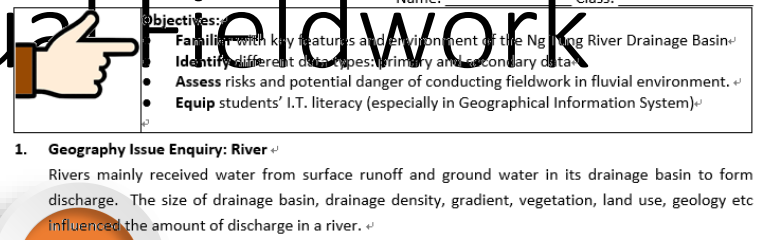
	G	K	I	J	K	Remarks
Distance from the source (km)						
Channel characteristics						
Channel width & depth						
Channel sinuosity						
Shape of the channel						
Others						
River characteristics						
Discharge						
Others						
Land Use & Surrounding						
Notes						
Assessment for the overall risk of flooding						

03

WORKSHEETS

of the Ng Tung River
Virtual Fieldwork

Worksheets for Conducting Virtual Fieldwork



Using Google Earth Presentation Mode to Conduct Pre-trip for Geographical Fieldwork
Virtual Pre-trip to Ng Tung River Drainage Basin in Hong Kong

[Student Worksheet]

Name: _____ Class: _____

Objectives:
- **Familiar** with key features and environment of the Ng Tung River Drainage Basin
- **Identify** different data types: primary and secondary data
- **Assess** risks and potential danger of conducting fieldwork in fluvial environment.
- **Equip** students' I.T. literacy (especially in Geographical Information System)

1. **Geography Issue Enquiry: River**

Rivers mainly received water from surface runoff and ground water in its drainage basin to form discharge. The size of drainage basin, drainage density, gradient, vegetation, land use, geology etc influenced the amount of discharge in a river.

01

Stage 1: Planning

Virtual pre-trip on a **river** landscape

- Explore characteristics of field sites
- Identify safety risks
- Estimate costs & labour needed
- Initiate start a fieldwork topic

?

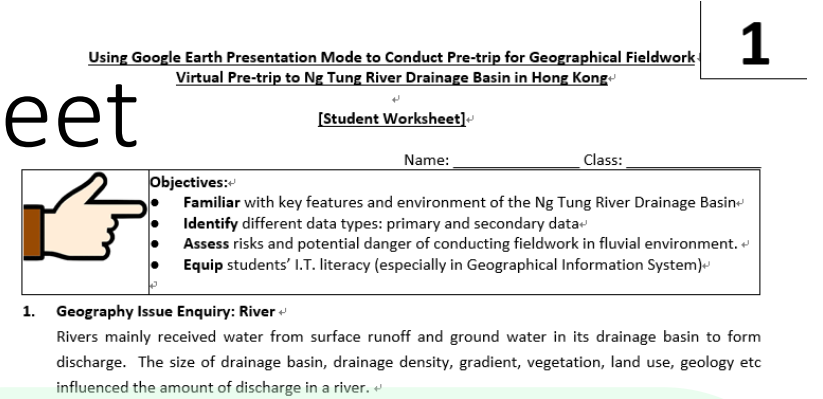
02

Stage 2: Data Collection

Virtual fieldwork on selected field sites & pre-set sampling

- Use **observation**, **field sketching** skills
- Collect secondary data
- Categorise meaningful data

Rationale of Using the Student Worksheet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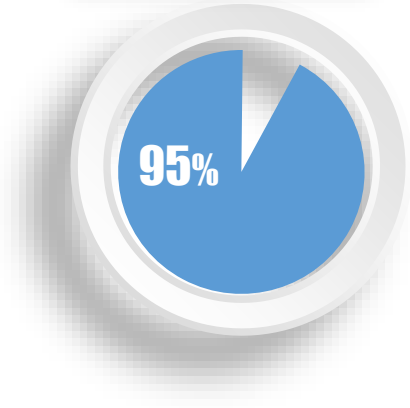
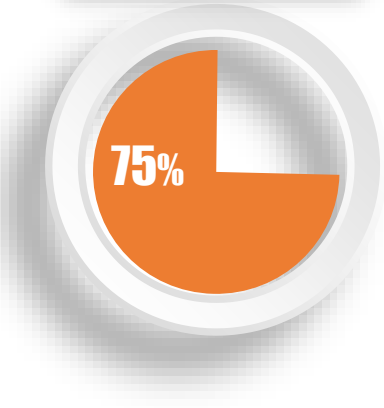
1. **Geography Issue Enquiry: River**

Rivers mainly received water from surface runoff and ground water in its drainage basin to form discharge. The size of drainage basin, drainage density, gradient, vegetation, land use, geology etc influenced the amount of discharge in a river.

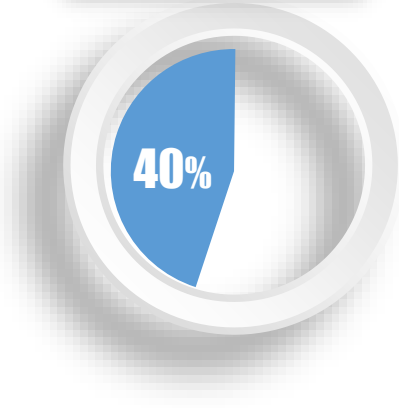
- Going through **various stages of field work** that help students to develop **sound logical**, **critical and independent thinking** of fieldwork design.



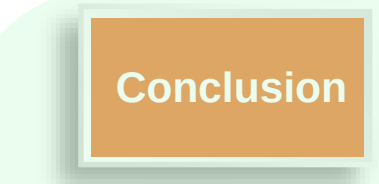
- **Site selection**
- **Safety**
- **Threats**
- **Select possible enquiry topic**



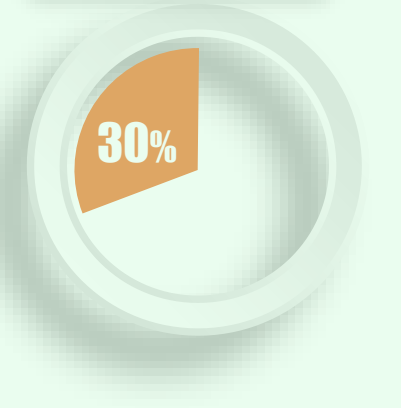
- **Secondary data**
- **Sampling method**
- **Observation**
- **Field sketches**
- **Reliable & Validity**



- Field sketches
- Scoring rubrics / summarized tables
- Compare others recorded data



- Validate hypothesis



- Reflect on alternative enquiry setting

Virtual Fieldwork Worksheet Design

PRE-TRIP

1

- Assess the **potential risks / difficulties** to conduct fieldwork in the selected sites.
- Developing / refining **own field enquiry question** based on the virtual pre-trip at the site.

Virtual Fieldwork

2

- Collect field data of Ng Tung River to learn **categorization / summarization / coding skills.**
- Justification of data collected and further improvements in future field enquiry.

Extended Tasks

3

- To do a **self-designed geographical issue inquiry** on river (e.g. self-determined methodology / collection of data etc)
- To **compare the findings** with repeated test at the sites in VFW.

Worksheet Demo (Appendix 2 : Data Collection & Data Logging)

Coding

Take the factor **"Flood prevention done"** as an example.

You can translate information from sketch diagram or 360° photographs into a coded score by different means. The table below shows some examples on how to collect and record data into quantitative scores (ordinal / ratio data). Each approach has its advantages and disadvantages. However, you have to record data in the same approach to make it **fair and comparable** across field sites.

1	Dichotomous scoring	Any observable human flood prevention work **1** No observable human flood prevention work **0**
2	Scaled scoring	Channelised river **5** Gabions / dams / weirs **3** Sand bags **1** Fully natural river **0**
3	Photo referencing scoring	Score between **0 to** [illegible] from some s[illegible]  ● Straight river ● Embanked ● Regular river bank ● Weed removed ● Higher river efficiency  **3** ● Embanked ● Slightly silted river

Logical thinking & decision making

Field Data Collection Form for virtual fieldwork on Ng Tung River (2

Name: _____

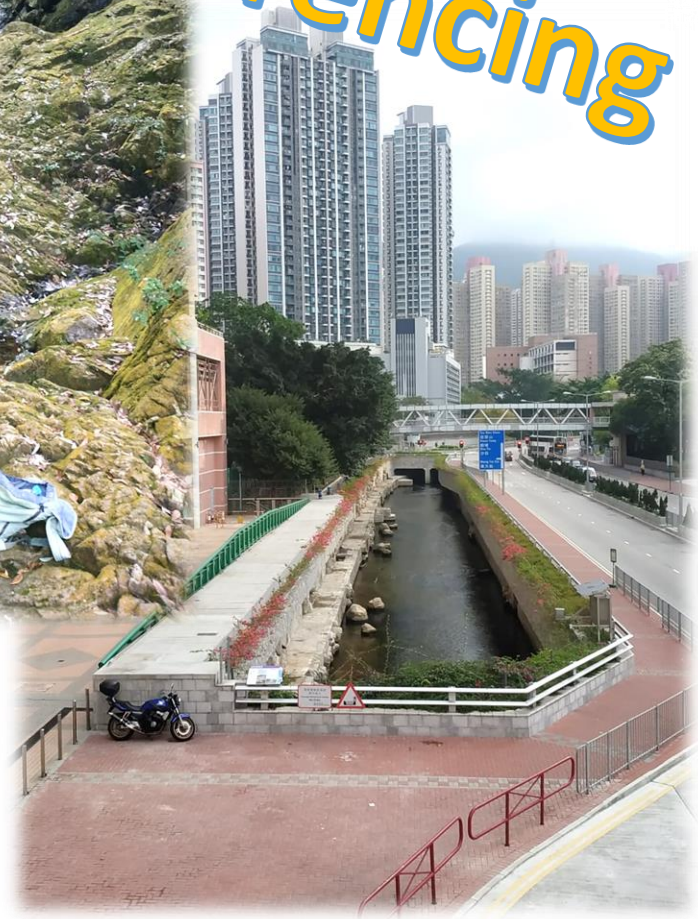
Weather condition: _____ Location characteristics: _____ Sam

	A	B	C	
Distance from the source (km)				
Channel characteristics (Refer to the Table in Section D2)				
River characteristics				
Vegetation – more vegetation reduces peak discharge that reduces the risk of flooding				
Human influence – more properties along the river may have a higher loss during flooding				

Logical thinking .. Scoring

- How can we score for risk of flooding according to the landscape of river photos?

Calibration / Referencing



Worksheet Demo (Appendix 2 : Fieldwork Based Questions)

E. Fieldwork-based Questions

A group of Geography students used Virtual Reality (VR) technology to conduct a virtual fieldwork to study river problems along Ng Tung River at the northeastern part of Hong Kong. Figure 1a provides the guidelines of this field study. Figure 1b shows the screen capture of a field photo in the virtual fieldwork. Table 1c shows the data collected during the fieldwork.

Figure 1a

Field study topic:	To study the risks of flooding along Ng Tung River
Data collection method:	(1) Select 13 field study sites which is separated by ab… each. (2) Carry out an assessment at … field data collection form.

Risk of Flooding along Ng Tung River - …	
Risk Factors that leads to flooding	**Scores (High: 5 / Medium: 3 / Low: 1)**
River discharge	
Vegetation Cover	
Intensity of economic activities	

Figure 1b

(a) Refer to Figure 1a

(i) Name the sampling method used in the research design. (1 mark)

(ii) Discuss the advantages of using the sampling method in (a)(i) in data collection for the field study topic. (3 marks)

(iii) Evaluate whether the number of sampling field sites should decrease from 11 to 3. (3 marks)

(iv) Name a type of secondary data in the fieldwork. Describe the procedures in collecting the data. (5 marks)

…ain the difficulties encountered in collecting data on …k. (3 marks)

Application of fieldwork knowledge learnt

… other Stages of Fieldwork

Stage 3. Processing, Analysing and Presenting Data

(c)(i) Refer to Table 1c and the virtual fieldwork materials. Suggest the scores for intensity of economic activities of sites E and G. Explain your rationale of scoring. (5 marks)

(ii) Your classmate gave different scores in (c) (i) for sites E and G. Explain a way to narrow the differences of the scores. (3 marks)

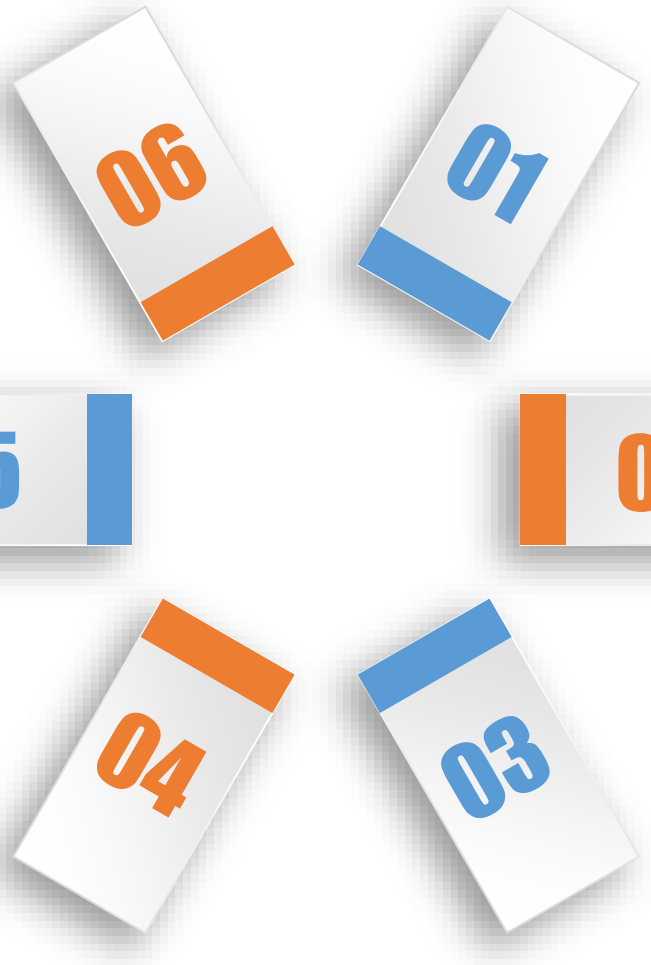
Stage 4. Conclusion

(d) "Flooding risks increase as river go downstream in Ng Tung River" Justify the statement based on your processed virtual fieldwork data. (4 marks)

Stage 5. Evaluating the fieldwork

(e) Suggest **another** field study topic that can be carried out along field sites (points A to K) with the same set of virtual fieldwork materials. Discuss the procedures to collect suitable field

Worksheet Pedagogical Design



Differential learning (for different abilities)

Progressive learning

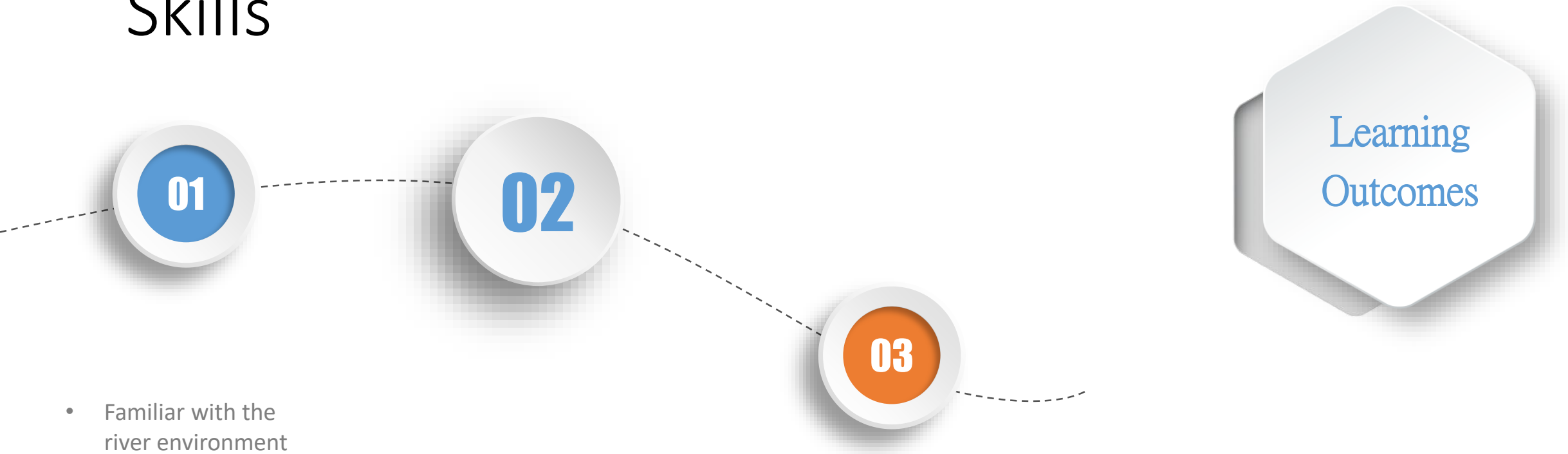
Problem based learning

Scaffolding

Scientific design thinking

Scenario-based learning

Students Learning Outcomes of Fieldwork Skills



- Familiar with the river environment of Hong Kong
- Apply geographical concepts in attempt to design a geographical issue enquiry

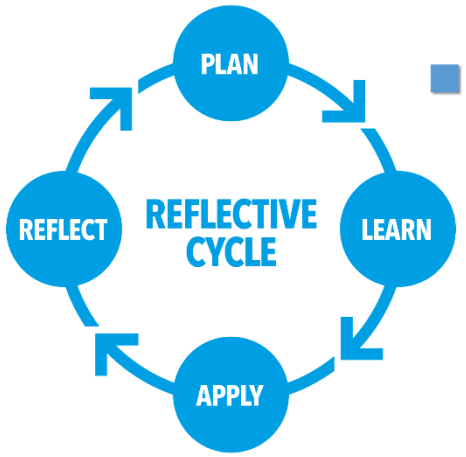
- Fill in summarize table by repeatedly observe and count variables of the field sites.

- Summarize and validate the data provided with hypothetical geographical theories.

Comprehensive understanding and application of fieldwork skills in various geographical issues

Reflective Thinking for Fieldwork Design

- Students need to fully aware of the relationship between **precipitation (rainfall)** and **discharge** in Hong Kong.
- Only take a virtual fieldwork once may not understand the **actual hydrological characteristics** of Ng Tung River.



Reflective Questions for Students after VFW

1) Planning: Consider safety or data accuracy?
2) Collection: One-for-all or multiple collection?
3) Presentation: Data reliable?
4) Conclusion: Can we make a solid and sound conclusion?
5) Reflection: Room for improvement?

Higher order thinking
Critical thinking

04

DISCUSSION

On the Using of Fieldwork Tools

Perceived Constraints for Virtual Fieldwork

- **Fixed route** and a **fixed screen**.
- Can only provide more verbal, imagery information of the site on a **particular day**.

Planning

- Biological threats?
- Restricted access?

Data Collection

- Site selection?
- Choice of sampling?
- Sufficient data collected?

Data Presentation

- Insufficient primary data to validate secondary data

Conclusion

- Accumulated biases & superficial interpretation may lead to **invalid conclusions**

Future Development for Virtual Fieldwork

01

02

Comparable VFW in other season

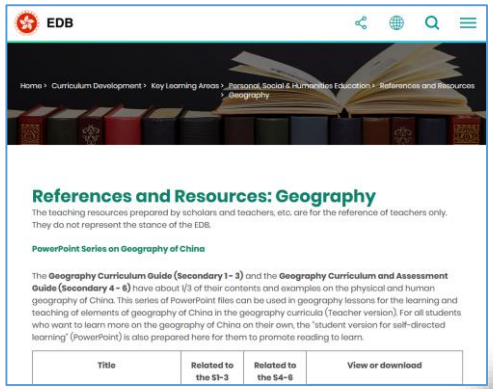
Drones tracking

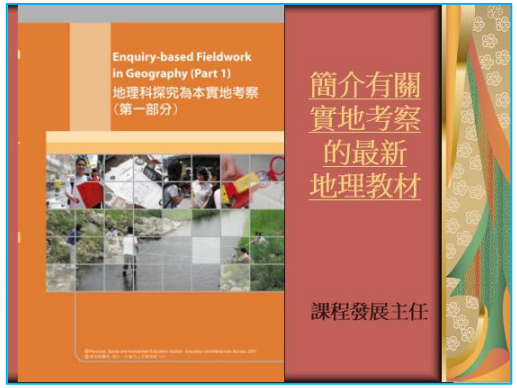
03

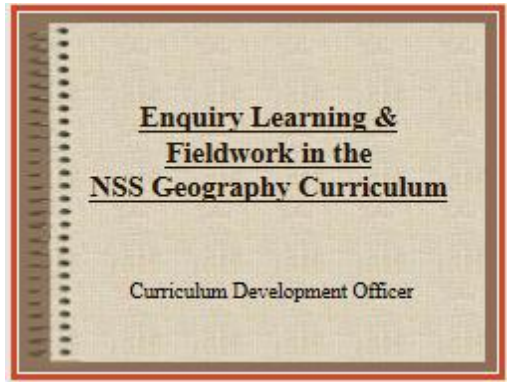
04

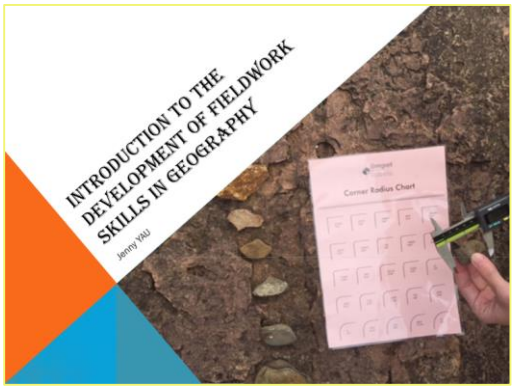
Shared / Authentic data set

Resources for Conducting Fieldwork in Geography









01

02

03

04

Thanks

Feel free to exchange ideas about conducting virtual fieldwork ☺

Po Leung Kuk Lo Kit Sing (1983) College
Geography Department

Tel: 2497 7110
Email: info@plk83.edu.hk