

# Data Collection & Analysis

2025

รศ.ดร.นพ. ชัยเลิศ พิเชิตพรชัย M.D., Ph.D.

ผู้อำนวยการ สถาบันนวัตกรรมการเรียนรู้

มหาวิทยาลัยมหิดล

<https://il.mahidol.ac.th>

Copyright 2025 Mahidol University





# What to cover...

---

1. Data Collection
2. Type of Data Collection
3. Data Collection Methods
4. Data Analysis



# 1. Data Collection

---

- Process of **gathering** and **measuring information** on **variables of interest**, in an **established systematic fashion** that enables one to **answer** stated research questions, **test** hypotheses, and **evaluate** outcomes



## 2. Type of Data Collection

---

### 1. Primary Data Collection

→ Raw data (slow but complete)

- Quantitative Research Method

- Numbers & Calculations

- Qualitative Research Method

- Non-calculable elements

### 2. Secondary Data Collection

→ From database, faster but incomplete



## 3. Data Collection Methods

---

1. Questionnaire
2. Form
3. Interview
4. Observation
5. Focus Group
6. Oral History
7. Document & Recording



## 3.1 Questionnaire

---

- Online / Paper Questionnaire
- Easy, Customization, Powerful, Low cost
- Close-ended / Open-ended Questions
- Relevant, Short and Structured Design
- Tools → Google Form  
<https://docs.google.com/forms>



# Questionnaire

<i>QUESTION TYPE</i>	<i>LEVEL OF DATA</i>
Dichotomous questions	Nominal
Multiple choice questions	Nominal
Rank ordering	Ordinal
Rating scales	Ordinal
Constant sum questions	Ordinal
Ratio data questions	Ratio
Open-ended questions	Word-based data



# Dichotomous Questions

---

- 1 Generally, how effective is the overall leadership in the school (tick one only):  
 Good       Not Good
- 2 Generally, how effective is the principal's communication in the school (tick one only):  
 Good       Not Good
- 3 Generally, how willing to communicate is the school principal (tick one only):  
 Good       Not Good





# Cross Tabulation

**TABLE 24.1 CROSSTABULATION OF RESPONSES TO TWO KEY FACTORS IN EFFECTIVE LEADERSHIP**

<i>Effective leadership</i>	<i>Principal's communication</i>	<i>Willingness to communicate</i>	<i>Frequency (% rounded)</i>
Good	Good	Good	45 (28.1%)
Good	Good	Not good	15 (9.4%)
Good	Not good	Good	10 (6.2%)
Good	Not good	Not good	12 (7.5%)
Not good	Good	Good	3 (1.9%)
Not good	Good	Not good	12 (7.5%)
Not good	Not good	Good	5 (3.1%)
Not good	Not good	Not good	58 (36.3%)
<b>Total</b>			<b>160 (100%)</b>



# Multiple Choice Question

Number of years in teaching

1–5

6–14

15–24

25+

Which age group do you teach at present  
(you may tick more than one)?

Infant/kindergarten

Primary

Secondary (excluding sixth form)

Sixth form only



# Rank Ordering

Please place these in rank order of the most to the least important, by putting the position (1–5) against each of the following statements, number one being the most important and number 5 being the least important:

- |                                                             |     |
|-------------------------------------------------------------|-----|
| Students should enjoy school                                | [ ] |
| Teachers should set less homework                           | [ ] |
| Students should have more choice of subjects<br>in school   | [ ] |
| Teachers should use more collaborative<br>methods           | [ ] |
| Students should be tested more, so that they<br>work harder | [ ] |



# Rating Scale

Please complete the following by placing a tick in one space only, as follows:

1 = strongly disagree; 2 = disagree;

3 = neither agree nor disagree;

4 = agree; 5 = strongly agree

Senior school staff should teach more

1

2

3

4

5

[ ]

[ ]

[ ]

[ ]

[ ]



# Constant Sum Question

---

‘Please distribute a total of ten points among the sentences that you think most closely describe your behaviour. You may distribute these freely: they may be spread out, or awarded to only a few statements, or all allocated to a single sentence if you wish.’

I can take advantage of new opportunities [ ]

I can work effectively with all kinds of people [ ]

Generating new ideas is one of my strengths [ ]

I can usually tell what is likely to work in  
practice [ ]

I am able to see tasks through to the very end [ ]

I am prepared to be unpopular for the good of  
the school [ ]



# Ratio Data

---

- True zero value, the true interval value
- Continuous data

How much money do you have in the bank? \_\_\_\_\_

How many times have you been late for school? \_\_\_\_\_

How many marks did you score in the  
mathematics test? \_\_\_\_\_

How old are you (in years)? \_\_\_\_\_



## 3.2 Form

---

- Social Data
  - Table of assigned ID and participants
  - Assigned ID: exclude identity
  - Age, Sex, Date, Time, ...
- Screening Form
  - Inclusion / Exclusion Criteria
- Recording Form
  - Independent variables ตัวแปรต้น
  - Dependent variables ตัวแปรตาม (ผล)

# Screening Form

## Preliminary questionnaire

16

Effects of visual words presented at different visual spans on recognition processing evaluated from visual event-related potential and reaction time

Participant ID code \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

Age \_\_\_\_\_ years Sex  Male  Female

Are you right handed or left handed?  Right  Left

Please answer the following questions.

1 Do you have following diseases or conditions?

a. Do you have normal vision or corrected vision?  Yes  No

b. Do you have neuromuscular diseases?  Yes  No

2 Do you have brain injury?

Never  Yes

If yes, please specify \_\_\_\_\_

3 Have you ever had fracture on right shoulder, arm, hand, and wrist?

Never  Yes

If yes, please specify \_\_\_\_\_

4 Have you ever used drugs or chemical that effect on CNS? (e.g. tranquilizer, stimulants, antihistamine)

Never  Yes

If yes, please specify \_\_\_\_\_

5 Do you have abnormality about language communication?

Yes  No





# Recording Form – Onsite

---

Time 1 : Baseline Heart Rate 1

Then drink a cup of coffee (50mg caffeine)

Time 2 : 30 min after: Heart Rate 2

Time 3 : 60 min after: Heart Rate 3

Date	Subject	Time 1	HR1	Time 2	HR2	Time3	HR3
1 Apr 22	M01	09.00	80	9.30	96	10.00	82
	M02	09.00	84	9.30	100	10.00	84
	F01	09.30	86	10.00	100	10.30	92
	F02	09.30	82	10.00	102	10.30	90



# WS: Google Form

---

<https://docs.google.com/forms>



## 3.3 Interview

---

- Face to Face, Webinar, Phone
- Time-consuming & costly
- Develop Open-ended & structured interview questions for an appropriate time
- Leave room for follow-up questions
- Observe body language, facial expression, voice mood & tone



## 3.4 Observation

---

- Onsite or Online Realtime Observation
- Recorded video
- Observe body language, facial expression, voice mood & tone
- Avoid bias & judgment



## 3.5 Focus Group

---

- Qualitative data collection
- Combination of interviews, surveys and observations
- Provides feedback and answers to the open-ended questions
- Aim to gather collective opinions rather than individual ones



## 3.6 Oral History

---

- Based on a single phenomenon or event
- Collection, preservation, and interpretation of historical data (based on the experiences and thoughts of people who were part of the particular event)



## 3.7 Document & Recording

---

- Secondary Data Collection
- Less time, less cost
- Data may not complete
- Literature Review
- Meta-Analysis



# Word-Based Data

---

- Qualitative Data
- Extract keywords
- Validity & Reliability
- Content Analysis





# 4. Data Analysis Methods

---

1. Quantitative Data Analysis
2. Qualitative Data Analysis

<https://research-methodology.net/research-methods/data-analysis/qualitative-data-analysis/>

<https://gradcoach.com/qualitative-data-analysis-methods/>



## 4.1 Quantitative Data Analysis

---

1. อธิบายคุณลักษณะ: ความถี่ ร้อยละ ฐานนิยม มัธยฐาน ค่าเฉลี่ย  
ความเบี่ยงเบนมาตรฐาน ความแปรปรวน พิสัย ควอไทล์ ส่วน  
เบี่ยงเบนควอไทล์
2. ความสัมพันธ์:
  - Simple correlation
  - Spearman rank correlation
  - Pearson Product Moment correlation ( $r_{xy}$ ),  
Partial correlation, Multiple correlations



## 4.1 Quantitative Data Analysis (2)

---

3. ทดสอบความแตกต่างระหว่างค่าเฉลี่ยสองกลุ่ม \*\*
  - **t-test** (paired t-test, unpaired t-test)
  - z-test
4. ทดสอบความแตกต่างระหว่างค่าเฉลี่ยมากกว่าสองกลุ่ม
  - ANOVA, F-test
5. ทดสอบความแตกต่างและความสัมพันธ์ของข้อมูลที่เป็นความถี่
  - Chi-square



## 4.2 Qualitative Data Analysis

---

1. Content Analysis
2. Narrative Analysis
3. Discourse Analysis
4. Thematic Analysis
5. Grounded Theory
6. Interpretive Phenomenological Analysis



# Q & A

---

# About the speaker



รองศาสตราจารย์ ดร.นายแพทย์ชัยเลิศ พิचितพรชัย

1. ผู้อำนวยการ สถาบันนวัตกรรมการเรียนรู้
2. ภาควิชาสรีรวิทยา คณะแพทยศาสตร์ศิริราชพยาบาล  
มหาวิทยาลัยมหิดล

Mobile: 086-363-1539

Email: Chailerd.Pic@mahidol.ac.th

Chailerd@gmail.com