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# ACHPER Queensland Brisbane HPE Conference 2018



## Senior Health workshop: Effective data skills are vital for student achievement

Dr Hugh Shannon | HPE Lecturer, Queensland University of Technology

LITERACY

NUMERACY

DATA

PRIMARY DATA



STATISTICAL ANALYSIS



THE FUTURE  
OF EDUCATION  
AND SKILLS  
*Education 2030*



THE  
FUTURE  
WE WANT

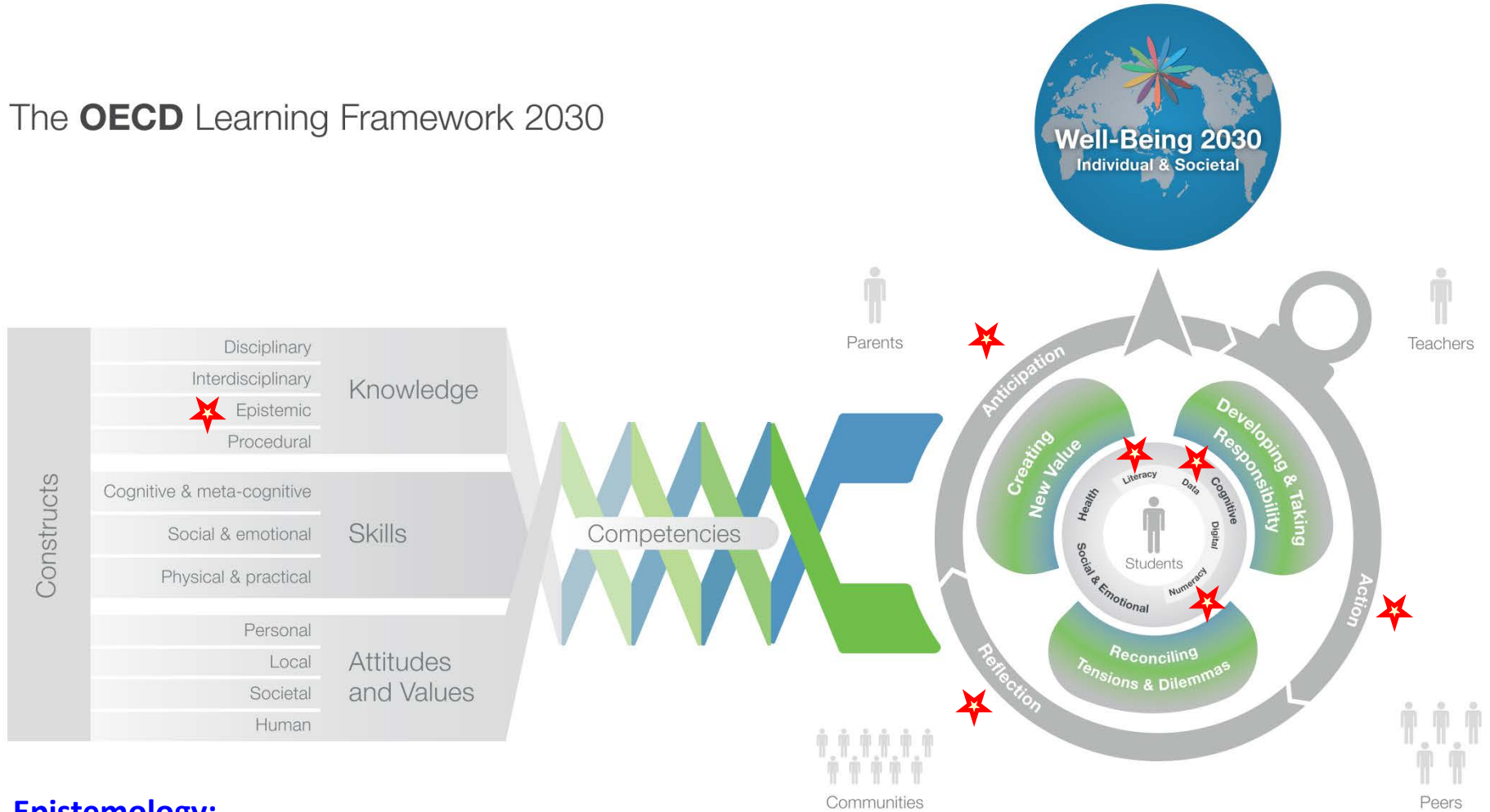


*“OECD Education 2030 stakeholders have co-developed the **Learning Compass 2030** that shows how young people can navigate their lives and their world. This Learning Framework 2030 offers a vision and some underpinning principles for the **future of education systems**. It is about orientation, not prescription.”*

(Organisation for Economic Co-operation & Development, 2018, p.3)

Source: <http://www.oecd.org/education/2030/>

# The OECD Learning Framework 2030



## Epistemology:

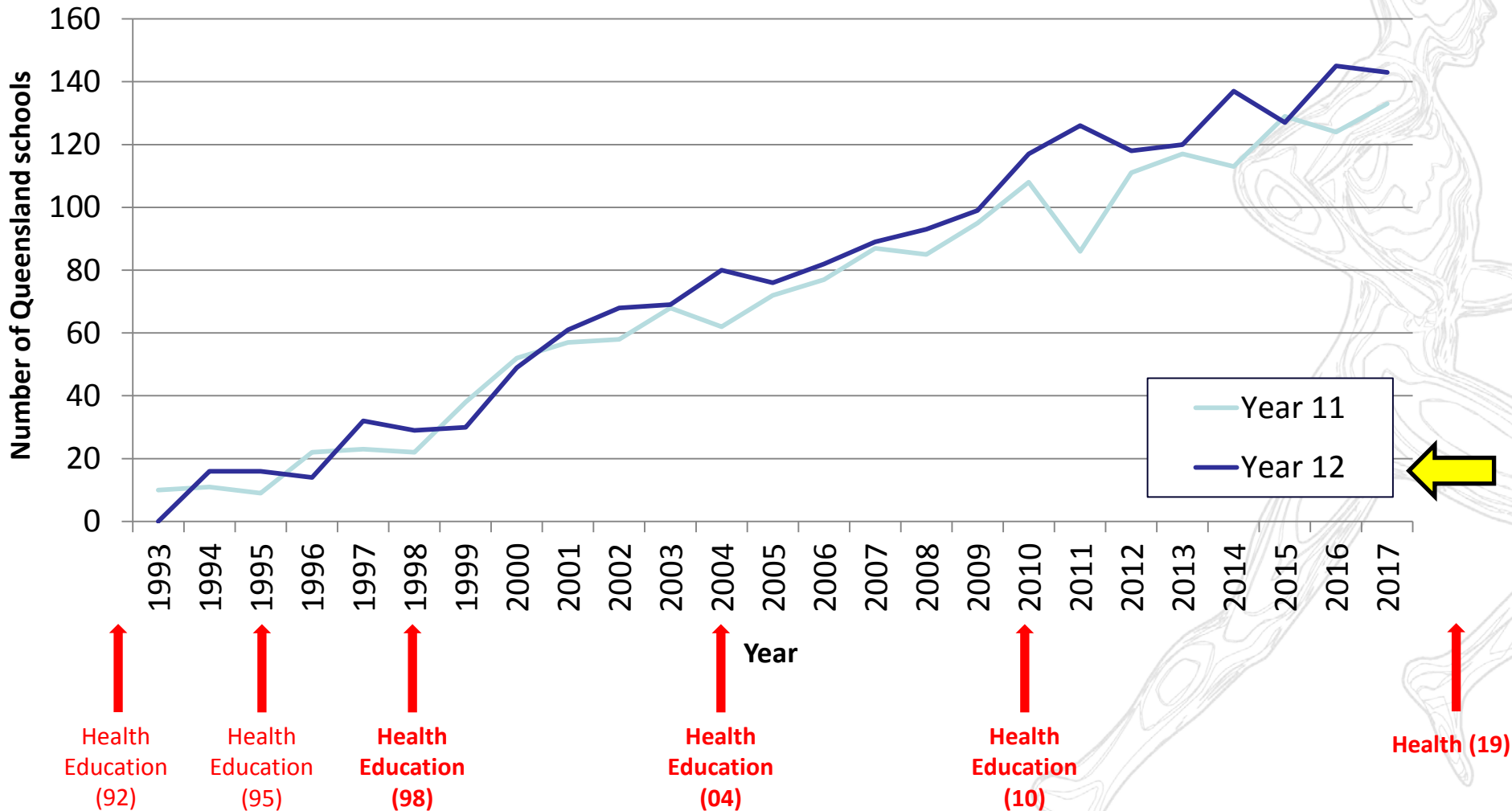
- Philosophical study of the nature, origin & limits of human knowledge
- Methods, validity & scope
- Distinction between justified belief & opinion

V16 OECD Learning Framework 2030

Figure 1. The OECD Learning Framework 2030: <http://www.oecd.org/education/2030/>



# Our subject: Developmental phases & enrolment data



Primary data source: <https://www.qcaa.qld.edu.au/publications/statistics>

# Health General Senior Syllabus 2019

## Health 2019 v1.2

General Senior Syllabus

This syllabus is for implementation with Year 11 students in 2019.

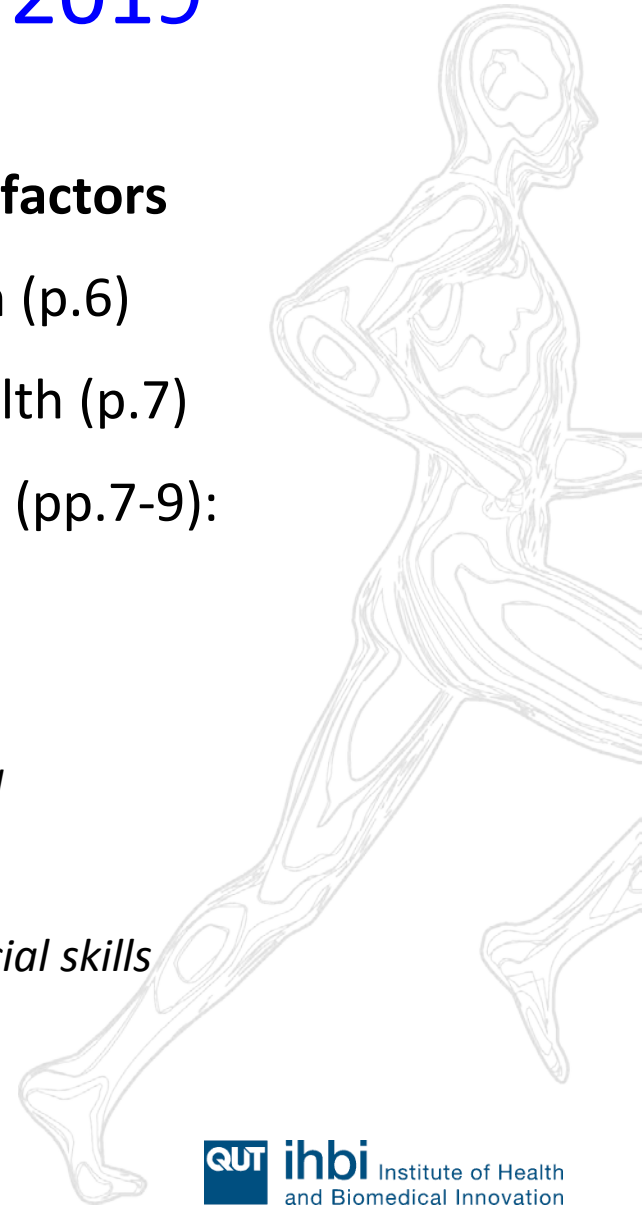


# Health General Senior Syllabus 2019

*Effective **data** planning, collection, management, analysis and reporting skills align with all of these foci*

## 1.2.2 Underpinning factors

- Literacy in Health (p.6)
- Numeracy in Health (p.7)
- 21<sup>st</sup> century skills (pp.7-9):
  - *Critical thinking*
  - *Communication*
  - *Creative thinking*
  - *Collaboration*
  - *Personal and social skills*
  - *ICT skills*

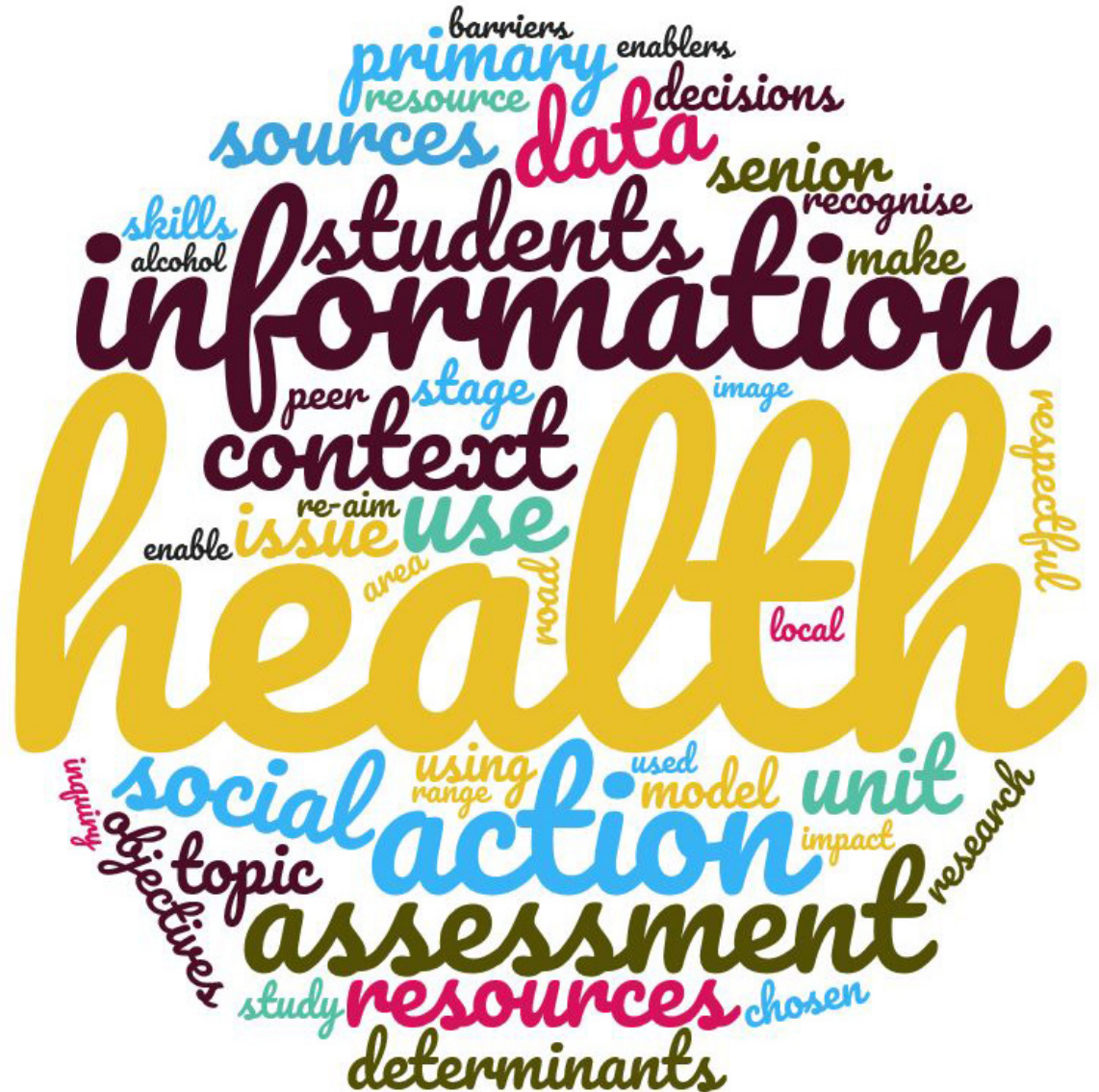




# Word cloud

- Generated from **Health General Senior Syllabus 2019** (QCAA) pp. 1 – 76
- Text converted to lower case
- Frequency <40 excluded
- Top ten:

504	health
249	information
224	action
185	assessment
177	community
152	use
150	context
138	students
137	social
132	data



*The ability to effectively plan for, **collect, manage, analyse and report** data is vital for student achievement in the subject Senior Health.*

**Objective:** This session will provide an opportunity to think about how students can be switched on to evidence based inquiry rather than turned off by perceptions of data, statistical analysis, numeracy or literacy.

# Values for consideration...

## 1. Investigative curiosity



*Desire to explore & learn is important intrinsic motivation*

## 2. Reliable & valid data is a critical foundation



*Great writing skills can't make up for limited data*

## 3. An unsupported hypothesis can be a valuable result



# Ethical research principles

## Stage 2: Plan and act

During Stage 2, students will:

- develop a specific and contextualised health issue statement
- synthesise information and data gathered in Stage 1 to prepare inquiry questions that include the approach, target group and social justice principle
- design and implement justified data collection methods that adhere to ethical principles
  - protection from harm
  - gaining informed consent
  - ensuring confidentiality and anonymity
- investigate data, trends, existing policy, practice and resources that are relevant to the specific, contextualised health issue

+ 'Stage 3:  
Evaluate &  
reflect' data skills

Participant data may be **identifiable** (e.g. semi-structured interview) or **re-identifiable** (e.g. questionnaire demographic data) to the researcher, but should be **de-identified** when reporting (e.g. numbered participants for descriptive case study analysis) to ensure **confidentiality**.

# Ethical research principles

## **Informed consent:**

- Background & invitation to participate
- Explanation of procedures
- Potential risks (+ mitigation & management)
- Potential benefits
- Rights of inquiry & withdrawal
- Knowledge of results (participants)

*Participant rights,  
reassurance, strong  
response rates & future  
research participation*

**Data management:** non-disclosure & safe storage (digital & hard copies)

**Reporting:** Aggregated data (quantitative & qualitative) vs qualitative individual cases (de-identified)

# The scientific method adapted for Senior Health research

What do we want to investigate?

**1. OBSERVATIONS**

What do we want to know?

**2. RESEARCH QUESTION(S)**

What is already known?

**3. BACKGROUND RESEARCH**

Proposed explanation based on preliminary evidence

**4. HYPOTHESIS**

How will the research be conducted?  
What primary data will be collected?

**5. METHOD** (research design & ethics)

How will the quantitative and/or qualitative data be managed?

**6. DATA COLLECTION**

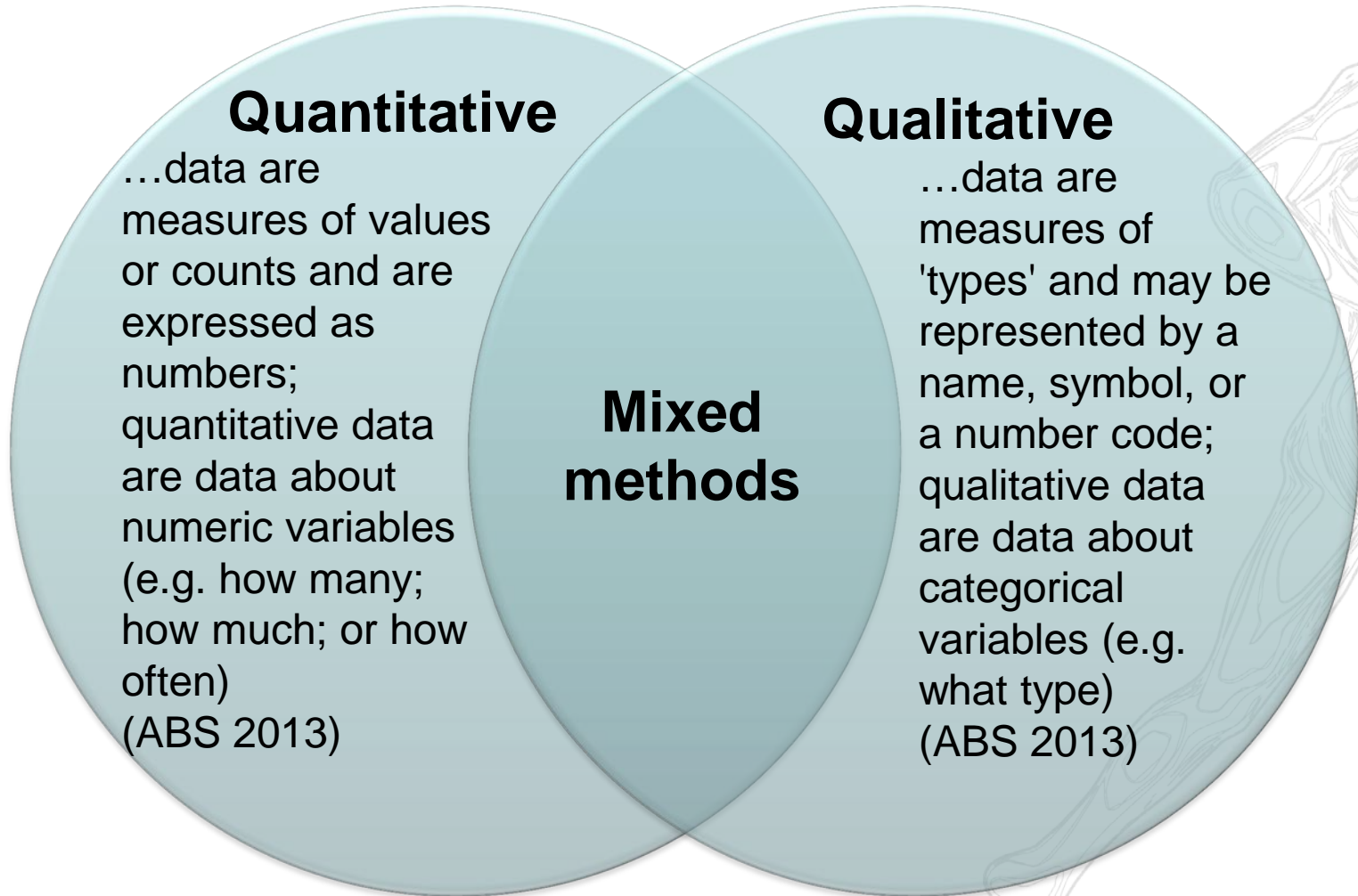
Does the data support the hypothesis?  
What conclusions can be drawn?

**7. DATA ANALYSIS & CONCLUSIONS**

What are the key findings, strengths and limitations of the investigation?  
How will the findings inform future research?

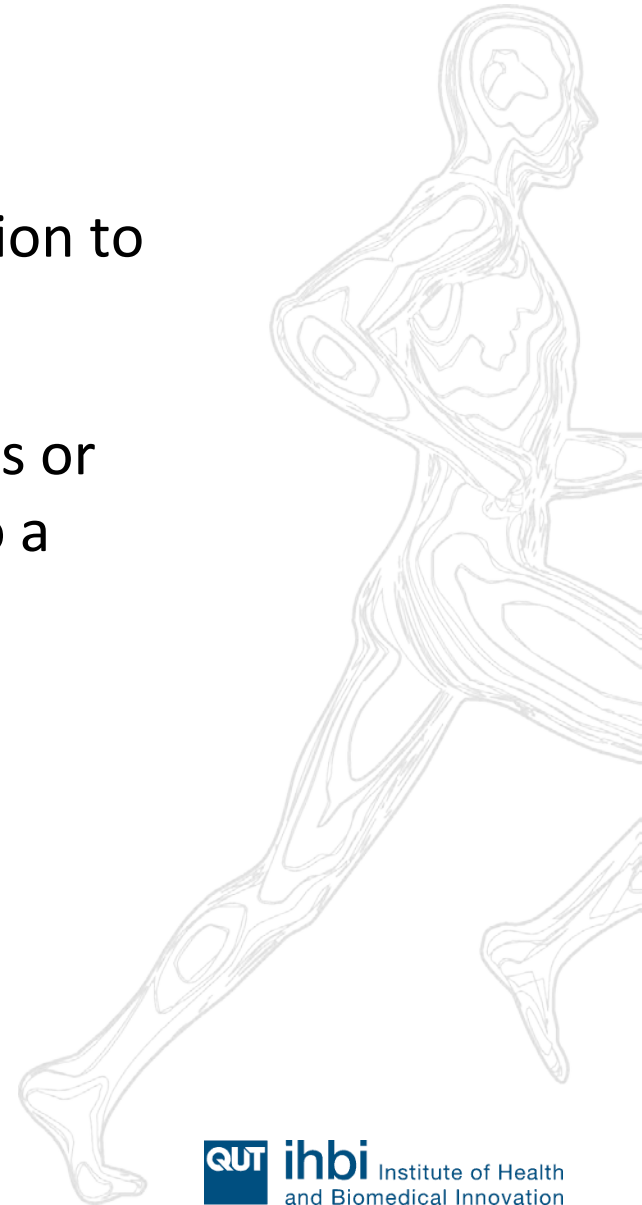
**8. REPORT RESULTS**

# Data types – Overview



# Terminology

- **Descriptive statistics:** Measuring a trait or characteristic of a group without any intention to generalize beyond the group
- **Inferential statistics:** Making generalisations or inferences from a smaller group (sample) to a larger group (population)
  - Q. Is the sample group representative?





# Activity

1. **Take a sticky note, jot down your favourite colour and a brief reason, then stick it on the wall**
2. **What descriptive data can we extract?** Sort the sticky notes to manage and analyse the data
  - Quantitative methods
  - Qualitative methods

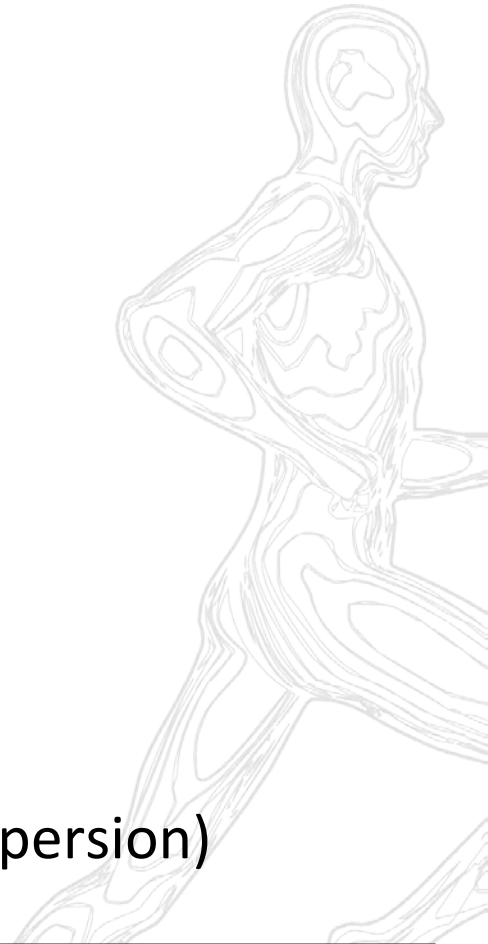
**Post activity discussion** – Examples: *Range, frequency counts, graphing (visualise), colour groupings (warm, cool, neutral) and grouping according to justification.*

# Quantitative data & analysis

- Measures of central tendency
  - Mean
  - Median
  - Mode
- Measures of variability
  - Range
  - Standard deviation (amount of variation or dispersion)

## Reporting example:

Sample group age range 17 – 56 years ( $M = 38.60$ ,  $SD = 10.25$ )



# Microsoft Excel functionality

Restaurant ratings - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW

Clipboard Font Alignment Number Styles

Normal Bad Good Neutral Calculation Check Cell

L7

RESTAURANT RATINGS							
5 point scale: lowest rating 1 to highest 5							
Restaurant 1	Rating	Mean	SD	Restaurant 2	Rating	Mean	SD
P1	4	4.3	0.67	P1	1	2.9	1.85
P2	3			P2	5		
P3	4			P3	4		
P4	5			P4	5		
P5	5			P5	1		
P6	4			P6	1		
P7	4			P7	2		
P8	5			P8	1		
P9	4			P9	4		
P10	5			P10	5		

## Example MS Excel functions:

`=AVERAGE(B5:B14)`

`=STDEV(B5:B14)`

1. =
2. Function (capitalised)
3. Target cells (list cell coordinates or place colon between end points for a range)

# Microsoft Excel functionality

Restaurant ratings - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW

Clipboard Font Alignment Number Conditional Formatting Table Styles

L7

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	<b>RESTAURANT RATINGS</b>																
2	5 point scale: lowest rating 1 to highest 5																
3																	
4	<b>Restaurant 1</b>	<b>Rating</b>	<b>Mean</b>	<b>SD</b>	<b>Restaurant 2</b>	<b>Rating</b>	<b>Mean</b>	<b>SD</b>									
5	P1	4	4.3	0.67	P1	1	2.9	1.85									
6	P2	3			P2	5											
7	P3	4			P3	4											
8	P4	5			P4	5											
9	P5	5			P5	1											
10	P6	4			P6	1											
11	P7	4			P7	2											
12	P8	5			P8	1											
13	P9	4			P9	4											
14	P10	5			P10	5											
15																	

## Examples of MS Excel functions:

=SUM

=AVERAGE

=COUNT

=STDEV

=MIN

=MAX

## Discussion – Data set comparisons:

1. Meaningful criteria (e.g. classification)
2. Student interpretation (e.g. the mid-point for this scale is 3 not 2.5)
3. Variability (dispersion)

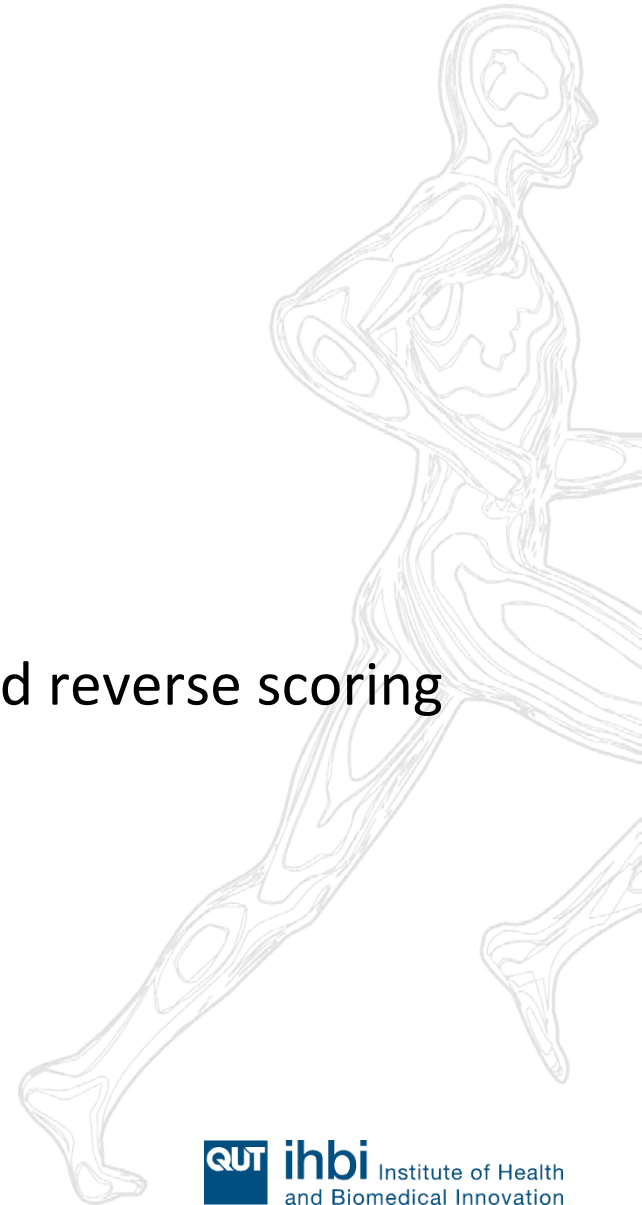
# Qualitative data & analysis

- Systematically extracting meaning from textual data (e.g. interview transcripts, focus group transcripts, questionnaire written responses, field observations, notes etc.)
- **Coding** = Analytical process of labelling, organizing, sorting & synthesising qualitative data
- Labelling usually involves assigning a word, phrase, number or symbol to each coding category
- **A priori codes** = the starting list which is modified as the process unfolds (e.g. similar codes/constructs might be merged to achieve a more manageable number)

**Example:** 'help seeking behaviour'

# Questionnaire design

- Scales:
  - Dichotomous (e.g. yes/no)
  - Interval (e.g. Likert scale – odd vs even)
  - Continuous (e.g. visual analogue scale)
- Strategy: Negatively phrased statements and reverse scoring



# Activity: Observed or potential issues?

- Data collection, management, analysis & reporting

Issues?	Preventive solutions?

# Potential problems to be mindful of

- **Measurement error**
- **Selection bias:** Is the sample representative?

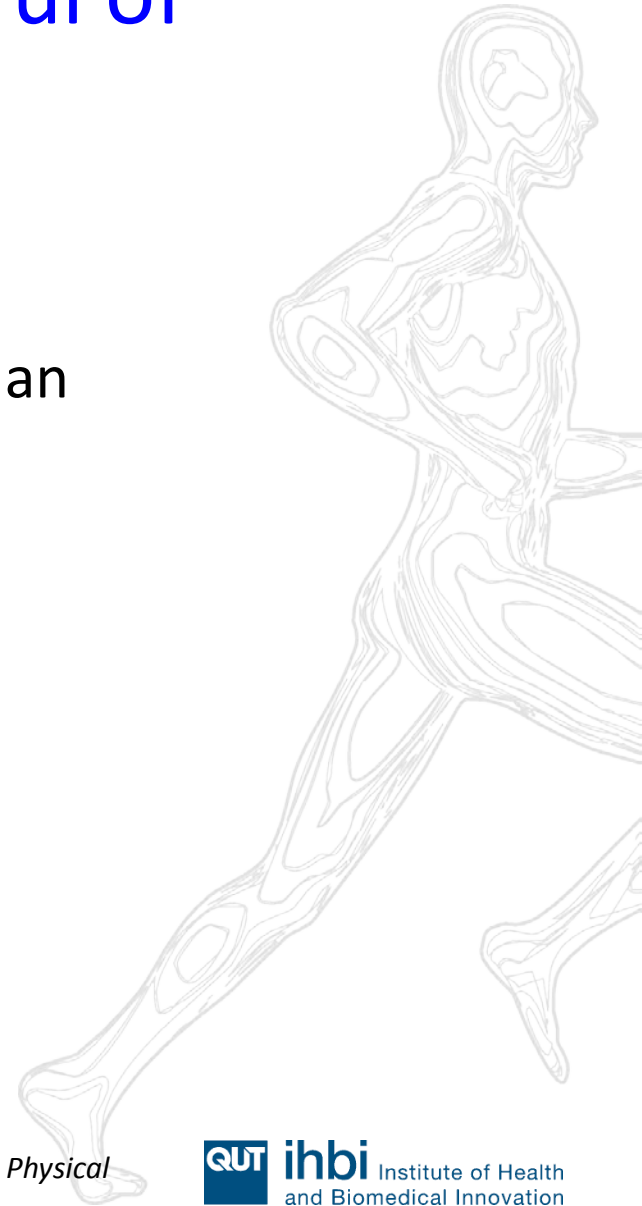
## **Selection bias example:** Sunshine State College

- Students required to collect data associated with school community perceptions & investigate sociocultural health determinants
- Participants selected from one year level & house (vertical structure)
- Students attempt to draw conclusions about the school community from a non-representative sample



# Potential problems to be mindful of

- **Hawthorne effect:** Presence of researcher impacts upon participant behaviour
- **Halo effect** (cognitive bias): Researcher has an expectation about participant performance (immediate judgement)



# Example – Year 10 Health: Field observation data

- **Scenario:** Pre & post intervention use of playground/oval area for recreational purposes during school breaks
- Camera positioning: drone\* (altimeter & GPS), camera tripod (reference point alignment)
- Timed sequence of photographs and student count
- Data visualisation – Graphing? Examples: time and density

\*Safety considerations & CASA regulations



**Image credit:** Dr Ian Renshaw (Skill acquisition – Queensland University of Technology)

# Activity – Action planning

## 1. Data type(s)?

- Quantitative
- Qualitative
- Mixed methods

## 2. Methods of data collection – Examples:

- Reflective journal
- Semi-structured interviews
- Focus groups
- Observation
- Questionnaire
- Others

ACHPER 2018 Brisbane HPE Conference – ‘Senior Health workshop: Effective data skills are vital for student achievement’  
Correspondence: Dr Hugh Shannon [h.shannon@qut.edu.au](mailto:h.shannon@qut.edu.au)

**DATA PLANNING RESOURCE**

Unit focus:

- Senior Health – Unit 1: Resilience as a personal health resource
- Senior Health – Unit 2: Peers and family as resources for healthy living (alcohol or body image)
- Senior Health – Unit 3: Community as a resource for healthy living (homelessness, road safety or anxiety)
- Senior Health – Unit 4: Respectful relationships in the post-schooling transition
- Other: \_\_\_\_\_

Three stages of health inquiry:  
Stage 1: Define and understand  
Stage 2: Plan for and implement action  
Stage 3: Evaluate and reflect on action

# More sophisticated quantitative data analysis

- Feel free to discuss more sophisticated data analysis (e.g. sample size calculation, t-Tests & ANOVA) with me
- Link up with an experienced mathematician on staff at your school



# ACHPER Queensland

- 2019 HPE Week: Showcase your school and teachers
- 2019 Awards: Consider nominating colleagues and students

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## News & Events

### ACHPER QLD Committee Member Wins Teaching Award

ACHPER QLD Management Committee [More →](#)

### 2016 Brisbane HPE Conference

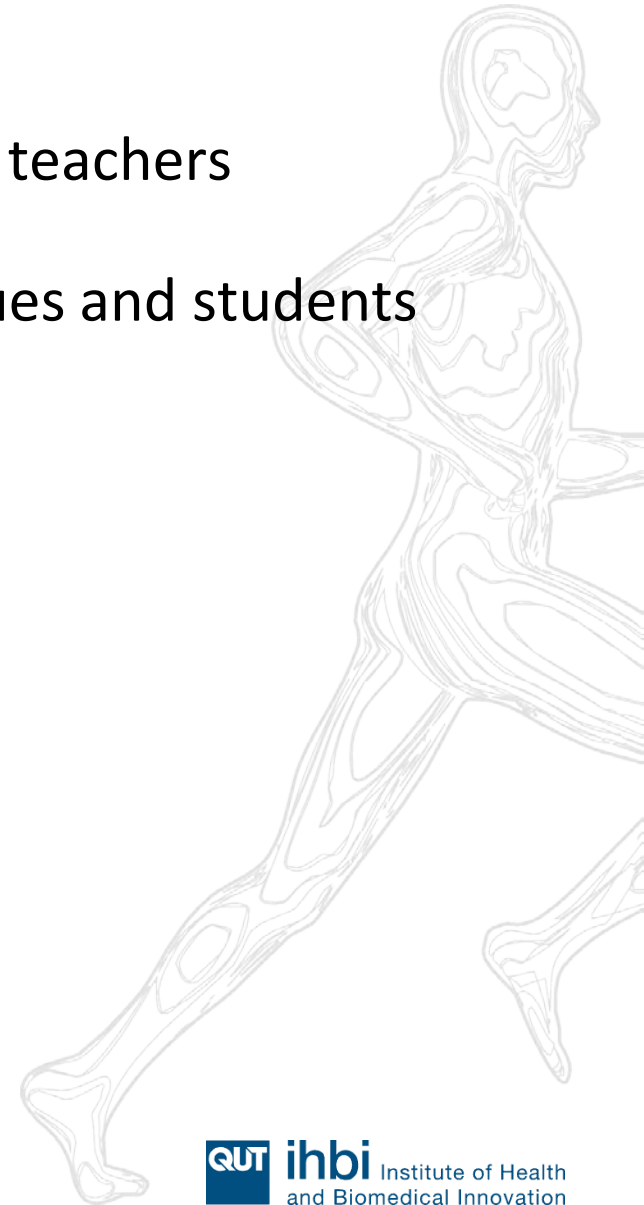
Thu 11 August 2016 to Fri 12 August 2016

### 2016 Women in Sport Breakfast

[Registration](#) • Wed 12 October 2016 to Thu

## *Advocating for quality Health and Physical Education in Queensland*

As the peak body for the Health and Physical Education profession in Queensland, ACHPER QLD will advocate for active and healthy lifestyles across Queensland educational communities; and deliver professional development programs and services in the areas of Health, Physical Education and Recreation.



# Questions and correspondence

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