

Evaluating Educational Innovation: Going beyond the measurable?

Martyn Kingsbury – Director of Educational Development

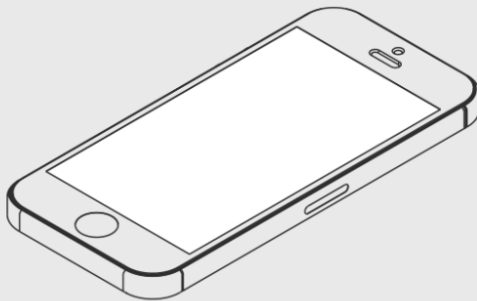
Jo Horsburgh – Principal Teaching Fellow in Medical Education



- What question do you have about evaluating educational innovations?
- Do you have a current educational project that you would be interested in evaluating?

What question do you have about evaluating educational innovations?

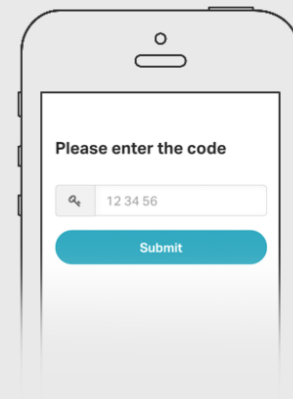
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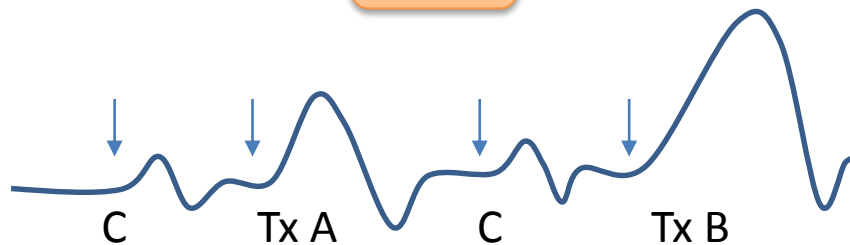
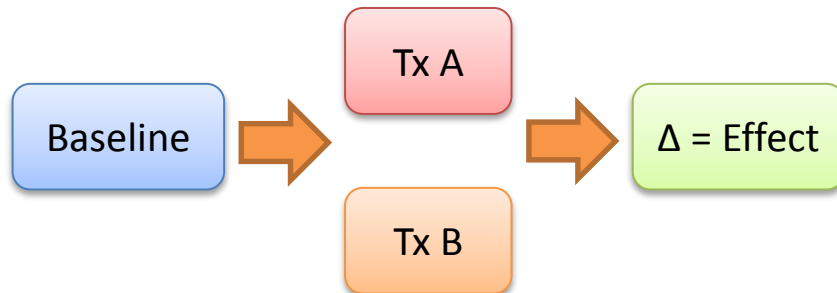
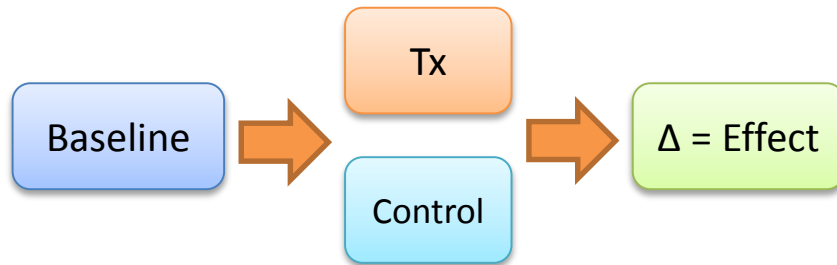
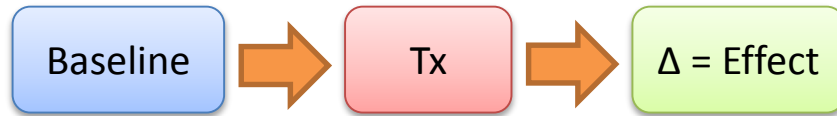


Can we measure learning and if so how?

Discuss with the person next to you whether it is possible to measure students' learning and if so how you might go about this



Experimental Approach





Experimental Approach

Hypothesis – A drug treatment improves lung function:

You ...

- use carefully bred, genetically identical guinea pigs
- keep them under controlled conditions (temperature, light, food, and isolated from other guinea pigs)
- randomly assign a control group that receives placebo
- treatment group that gets a precise dose of drug
- at set time-point – use a standard protocol to measure lung function - sacrifice the guinea pigs & examine lung structure



Experimental Approach

Hypothesis – An educational intervention improves learning:

You ...

- use “guinea pigs” that are selected to be diverse
- have no control over what they do most of the time
- treatment group is put in a large room & exposed to teaching – some are asleep, some have done it before & some aren’t there
- release your “guinea pigs” back into the “wild” where they are exposed to multiple other planned & unplanned learning - they mix with your control group (that got a different treatment – you weren’t allowed to not teach them) & share versions of the teaching
- later you use a protocol designed to measure lots of other things to estimate an indirect measure of the learning you are interested in



Experimental Approach

- find not all your “guinea pigs” make the test & some that do actually were exposed to multiple different ‘treatments’
- suspect some of the treatment group mostly drank beer and watched daytime TV, while others repeatedly exposed themselves to your ‘treatment’ via panopto
- some of your controls did the same – while others found the Harvard MOOC on the same topic
- find all the test really measures is how used to being measured your “guinea pigs” are - and how good they are at predicting what the test will be
- are not allowed to sacrifice the “guinea pigs” to examine brain structure - so you question them about their learning
- most ignore your questions – the only consensus was that the room was too hot ... & you should have prepared them more for the test!

Experimental Approach

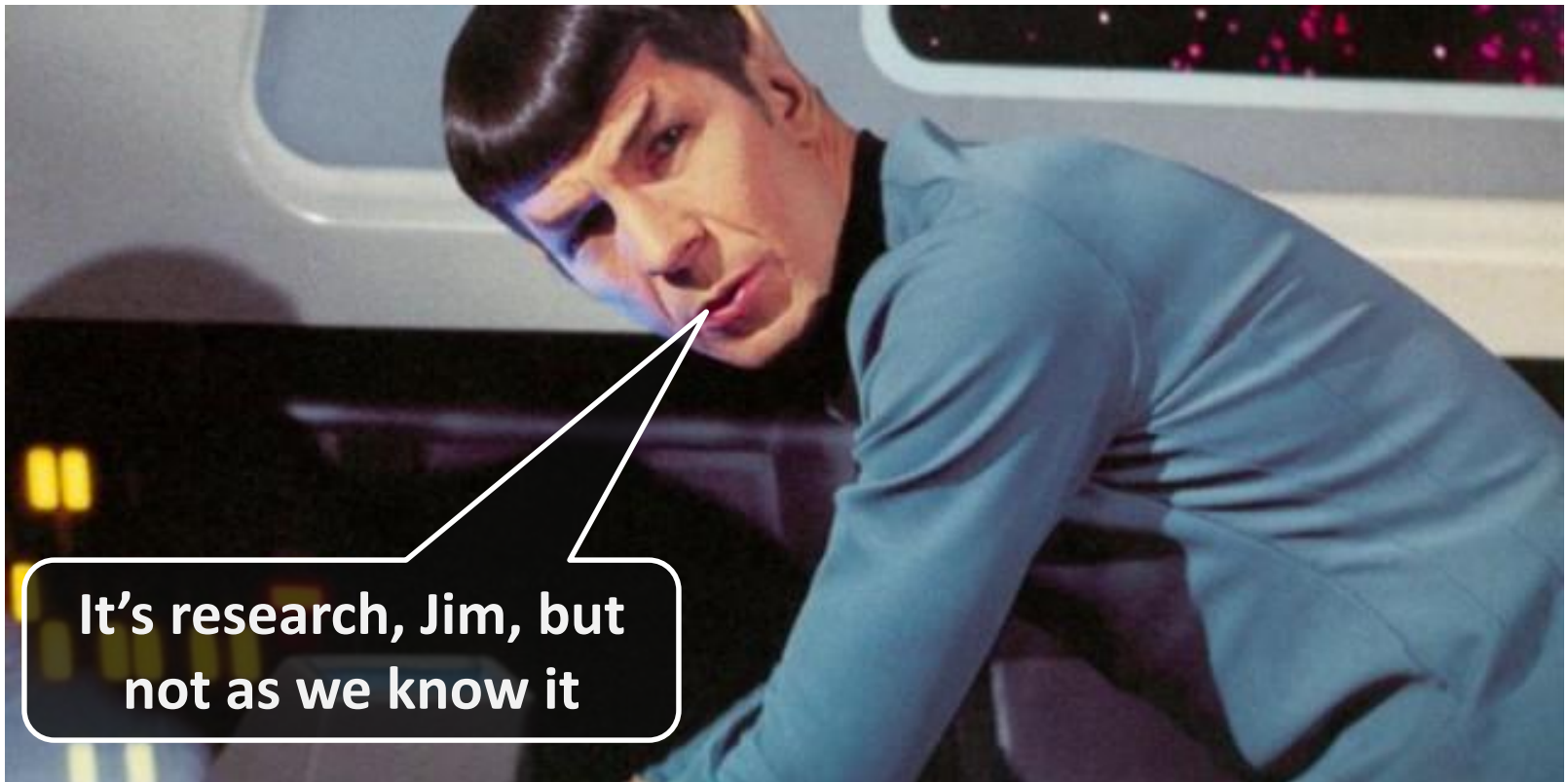
Quantitative

- Relating to quantity – measurable
- Investigates controllable measurable parameters and attempts to derive objective truths or laws
- Uses large sample numbers in a controlled environment to derive power
- Deductive approach
- ‘Scientific’ or ‘Positivist’

Qualitative

- Relating to qualities, views, attitudes
- Investigates meanings as perceived by those affected by them - subjective
- Situated in the real world rather than the laboratory & is often concerned with individuals
- Inductive approach
- ‘Naturalistic’

Pedagogic Research



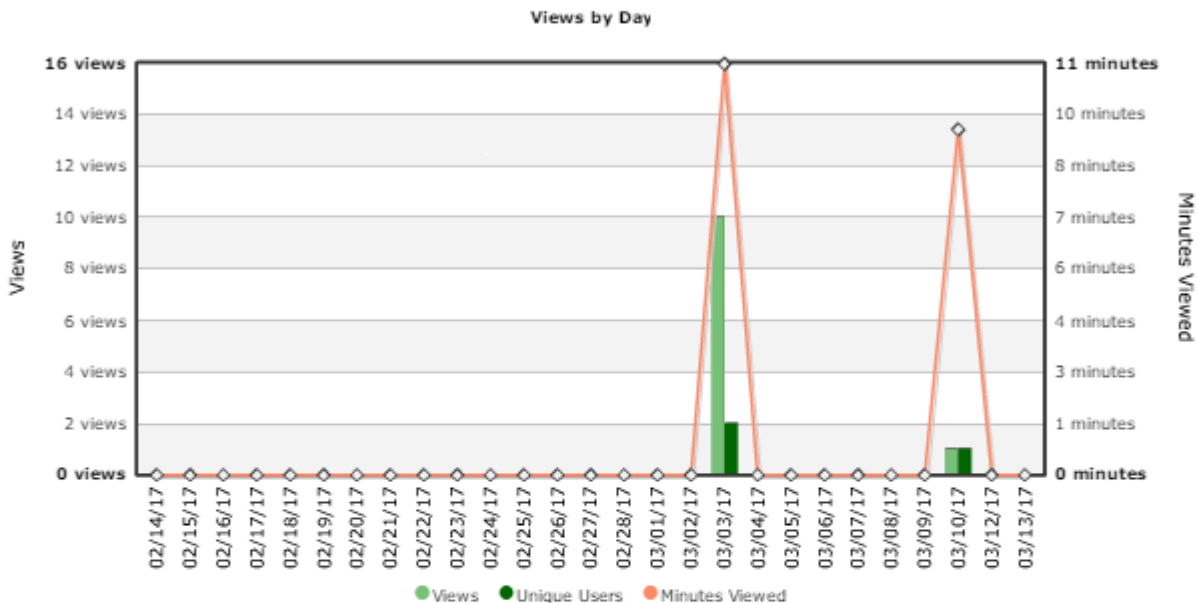
**It's research, Jim, but
not as we know it**

**So what could be
measured?**

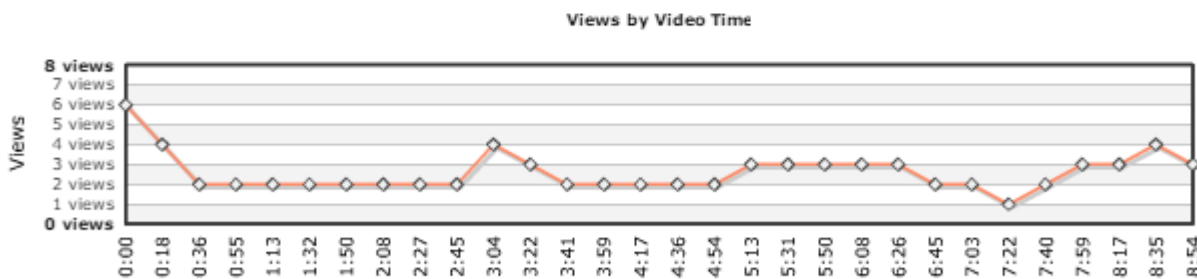
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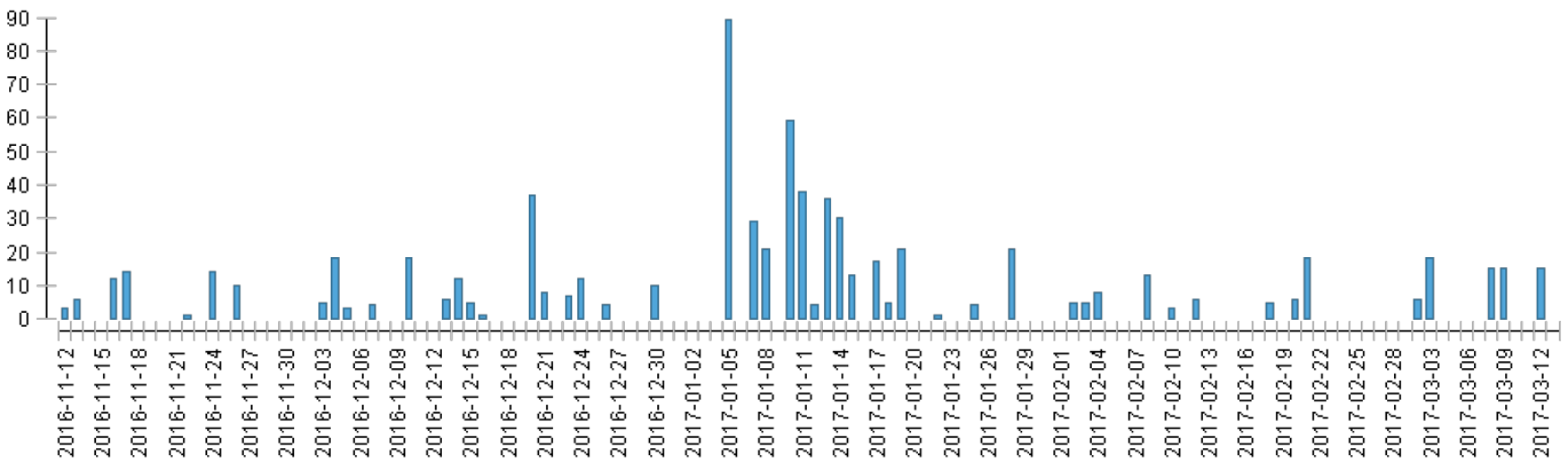
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Total												3	6	0	0	12	14	0	0	0	0	1	0	14	0	10	0	0	0	0	60	



The following questions refer specifically to your **Mathematics teaching practice**

I will be able to achieve most of the goals I have set for myself

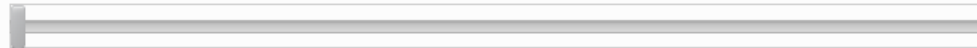
Yes

No

Not Sure

How much do you think participating in the ATOM programme contributed to this? (the further you drag the slider towards the right, the higher the level of contribution)

Level of contribution

A horizontal slider bar with a dark grey track and a lighter grey handle on the left side, positioned at the beginning of the track.

When facing difficult teaching tasks, I am certain that I will accomplish them

Yes

No

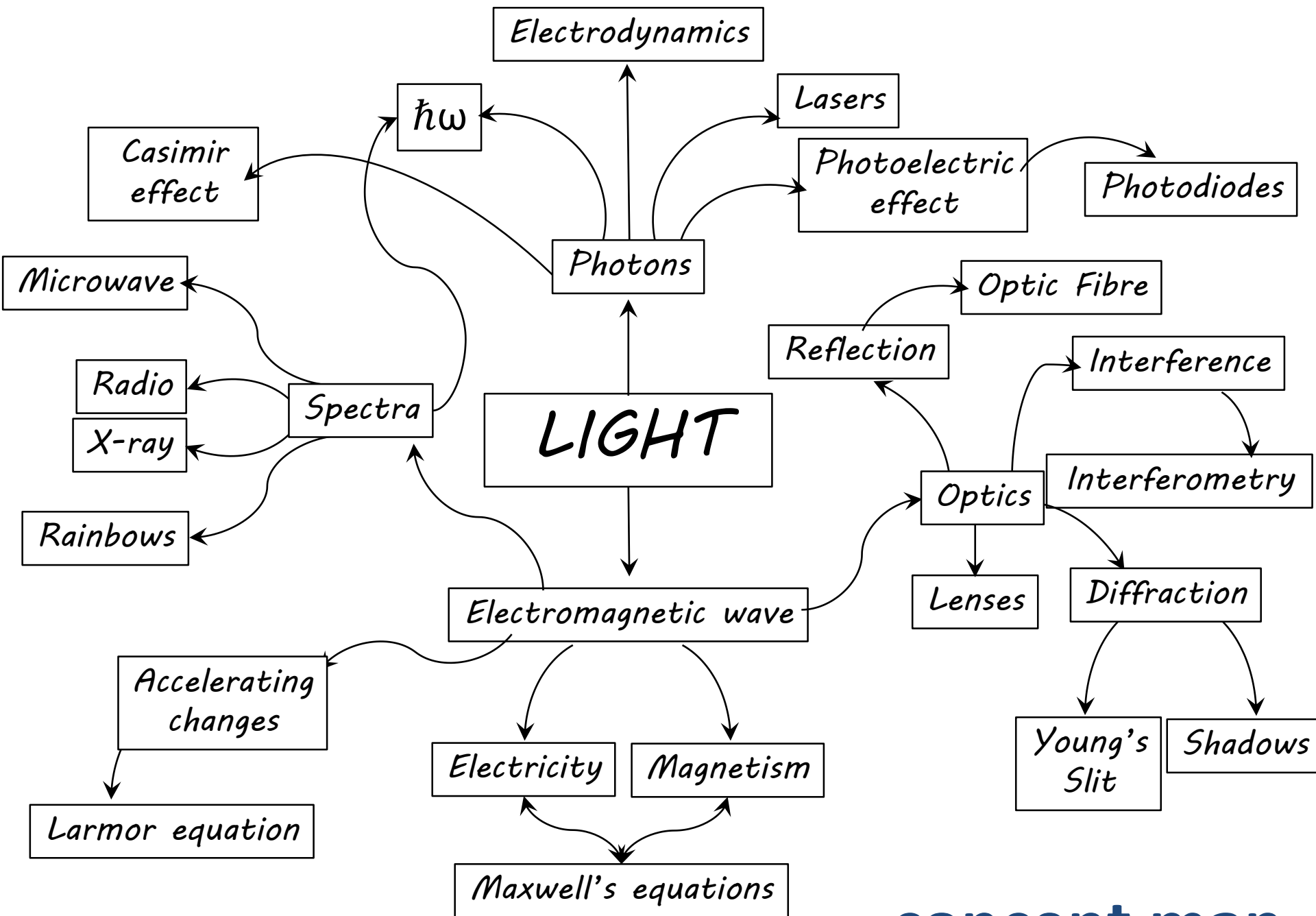
Not Sure

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In terms of teaching of mathematics, I think that I can obtain outcomes that are

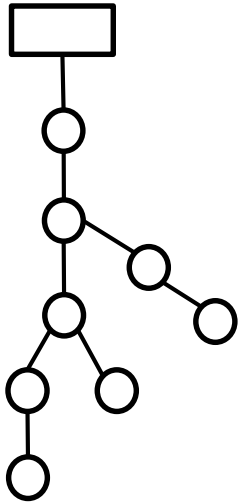


concept map

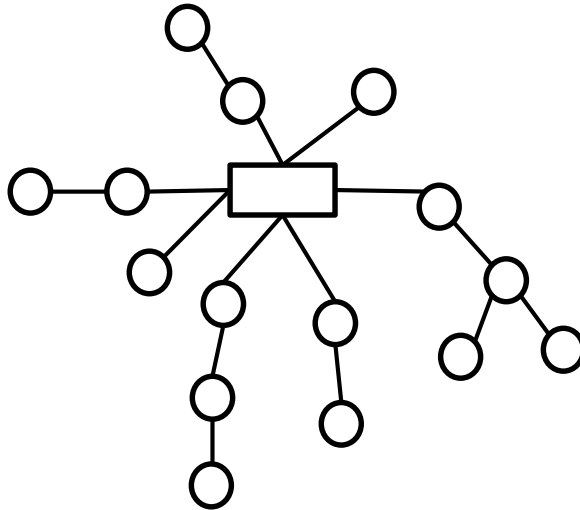
Concept Map Morphology

Concept Maps:

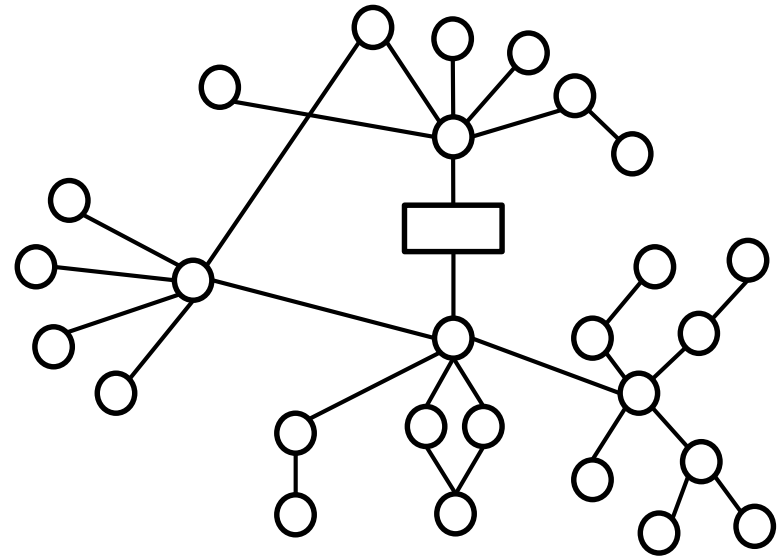
- ‘capture’ conceptual understanding of a topic
- Content & relational structure indicate ‘understanding’
- Can be analysed quantitatively & qualitatively



Chain

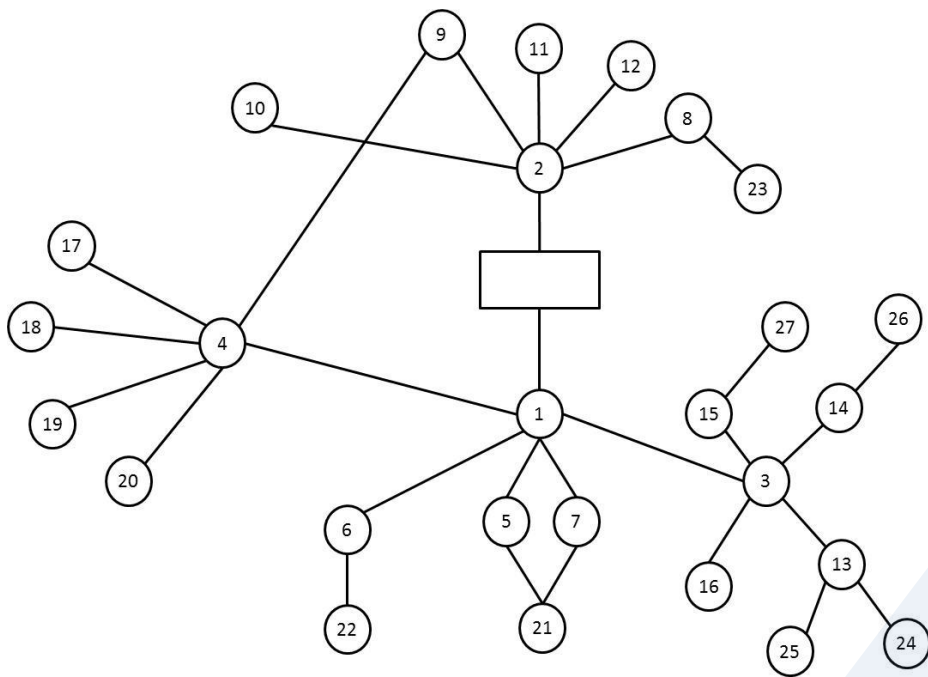


Spoke

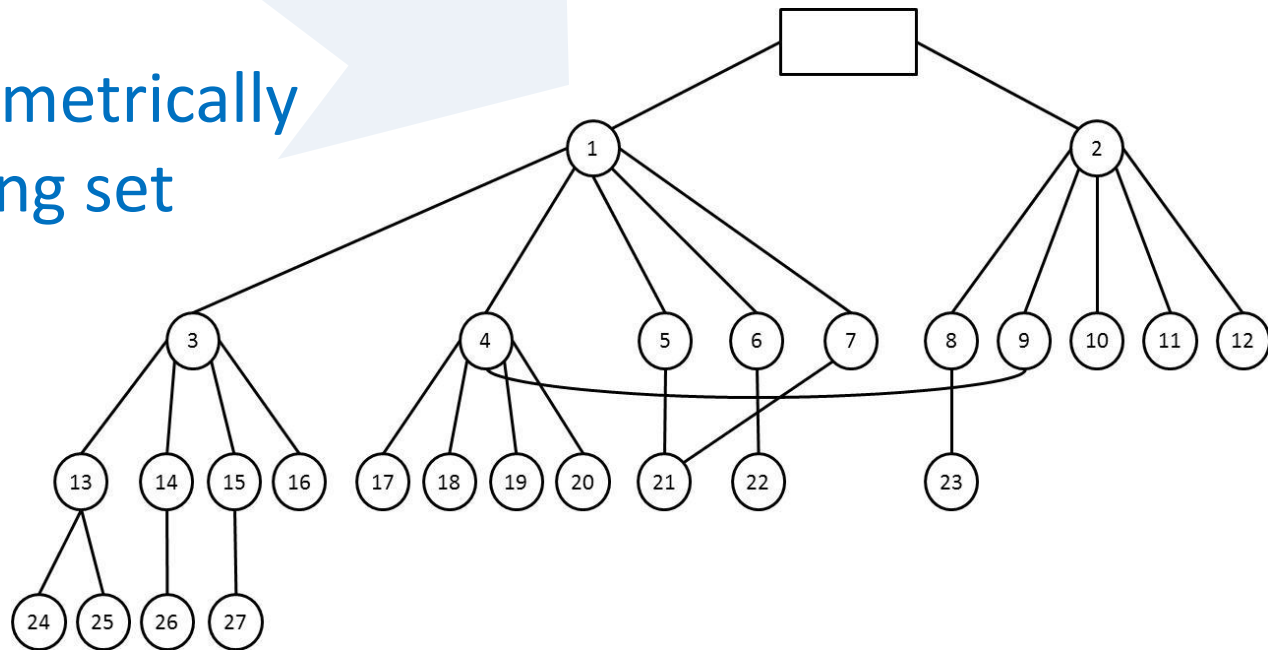


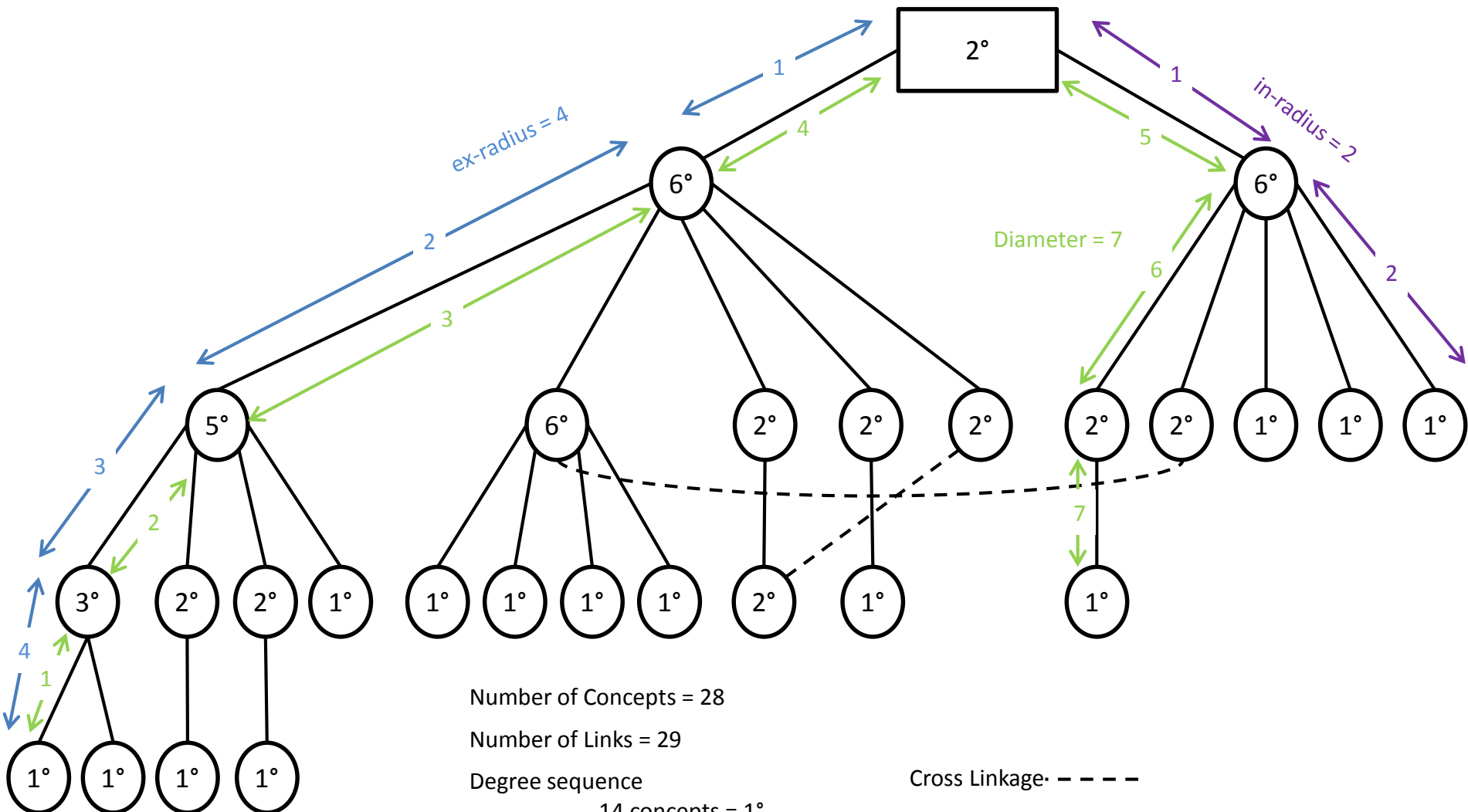
Network

Topological Normalisation



concept map is geometrically re-arranged following set rules.





Number of Concepts = 28

Number of Links = 29

Degree sequence

14 concepts = 1°

9 concepts = 2°

1 concept = 3°

1 concept = 5°

3 concepts = 6°

Cross linkage = 7%

Dimension = 1.6

Balance = 50%

calculation of basic structural parameters

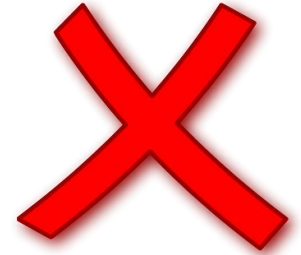
Going beyond the measurable

Ask them – interviews, focus groups

Observe them – ethnography, documents



Interviews



Do you wish to investigate emotions, experiences, feelings, preferences, opinions, attitudes?

Depth of data rather than breadth

Opportunity to probe, clarify etc

Does the research involve getting privileged information from key players?

Not anonymous

Increased power imbalance if interviewing students

Honesty about “bad” things – where anonymity might allow these to be revealed

Time consuming

Focus Groups



Can be less intimidating
for participants

Focus on interaction
between participants

Quicker than one to one
interviews

Participants may not want
to reveal personal
information

Difficult to manage group
dynamics

Observations



More natural behaviour

Observe behaviour that is difficult to articulate or discuss

Overt or covert?

Issues of consent?

Can be difficult to record observations



Document analysis



Provides contextual information

No participants

Can gather a large amount of data which can be analysed with software

Not possible to see how these documents are experienced

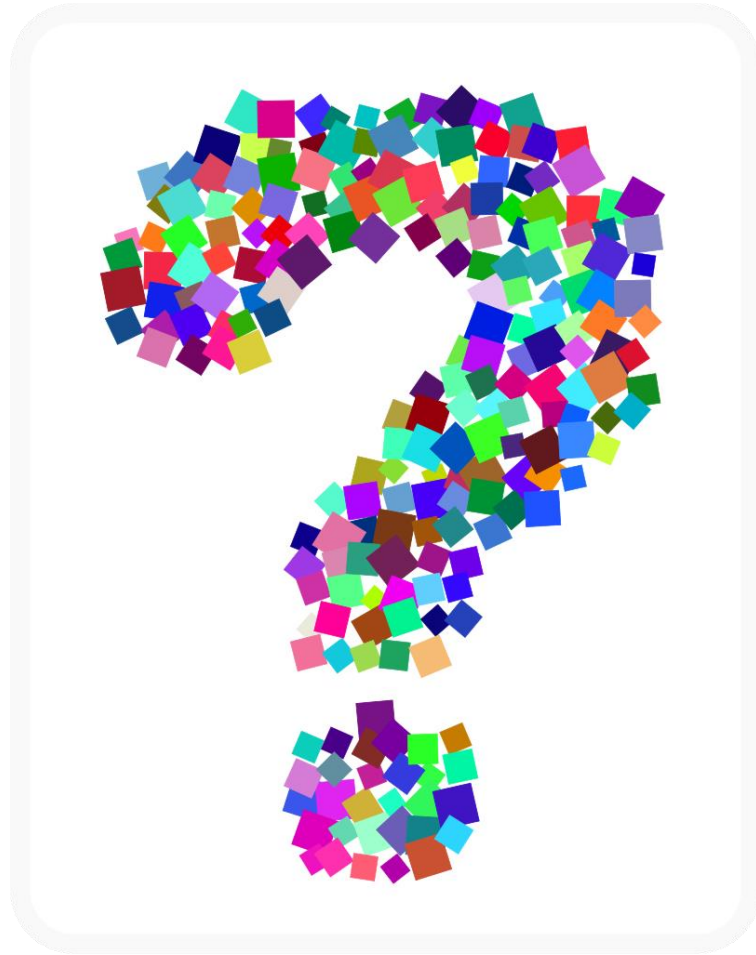
VALIDITY

- Validity in **quantitative** research often concerns: objectivity, generalisability, replicability, predictability, controllability – a large controlled sample gives predictive power
- Validity in **qualitative** research often concerns: honesty, richness, authenticity, depth, scope, subjectivity, strength of feeling, catching uniqueness, holistic – a purposeful sample gives negotiated meaning

Generalisation

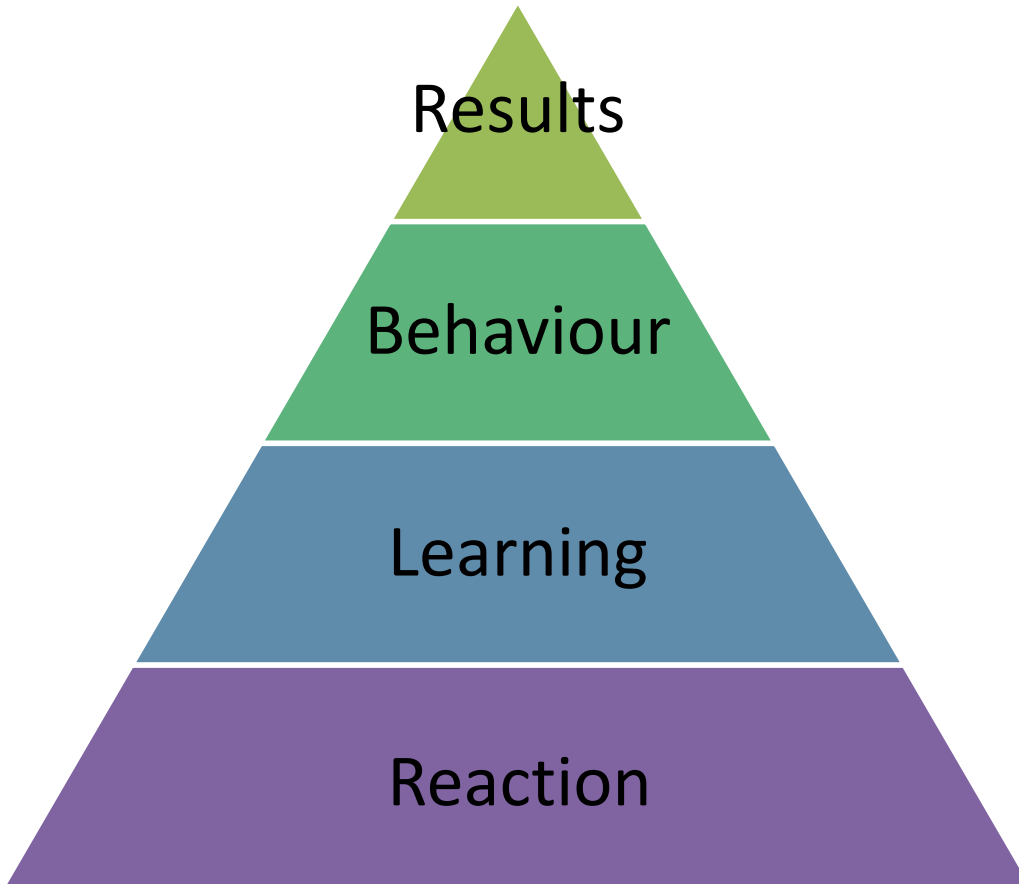
- Generalisation in **quantitative** research often concerns the controlled replicability of methods and data – As there is often an assumed single ‘truth’ ideas are often communicated at the level of method & data
- Generalisation in **qualitative** research often concerns empathy with data & confirmation of ideas – As there may be more than one ‘truth’, data is very contextual and it is the interpretation and generalised ideas that are communicated

How do you decide on methods?



What is it you
want to find
out about?

Kirkpatrick's (1994) model of evaluation



Research and Evaluation

Personal investigation – *leading to personal knowledge that informs own practice*

Local Investigation – *leading to local knowledge that informs the practice of a defined group*

National/international investigations – *leading to journal published or conference presented research*

Research Ethics

Ethical Principles:

- *Respect for persons*
- *Beneficence*
- *Justice*

Core Ethical Processes:

- *Informed Consent*
- *Risk / Benefit assessment*
- *Subject Recruitment / Selection*

Possible Ethical Pathways:

EERP - Low-risk educational research

MEEC - Involving IC Med students

ICREC - Involving problematic or sensitive issues

IRAS - Involving Patients or non-anonymised patient data

Further help and support

Networks and events ▾ For new lecturers For postdocs For research students Consultancy

Home / Staff / Educational Development Unit / Networks and events / Education Enquiry Network (EDEN)

Education Enquiry Network (EDEN)



EDEN (**E**ducation **E**nquiry **N**etwork) is an informal, peer support network promoting scholarly enquiry and the dissemination – publication of findings. This includes, for example, research by alumni of the College’s MEd in ULT and MEd SE programmes, or of equivalent programmes; or College staff interested or engaged in doctoral-level study in Education, through registration for an EdD or PhD at another university.

Further help and support

Medical Education Research Unit

Prof Sue Smith

- Funding for projects and Conference attendance
- Project Pal
- Monthly meetings



Further help and support



Need help with searching the educational literature or using the education databases?

See your campus librarian or use ASK button on the library homepage.

- **What question do you have about evaluating educational innovations?**
- **Do you have a current educational project that you would be interested in evaluating?**

What might you do now as a result of this workshop?

References

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Further reading

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