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?

1. Grab your phone
2. Go to www.menti.com
3. Enter the code 64 92 01 and vote!
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

Baseline → Tx → Δ = Effect

Baseline → Tx → Δ = Effect

Baseline → Tx A → Δ = Effect

Baseline → Tx B → Δ = Effect

C → Tx A → C → Tx B
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
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
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’
It’s research, Jim, but not as we know it
So what could be measured?
Stats for Feedback

Minutes viewed data current as of: 3/13/2017 1:13:39 PM (GMT Standard Time)

Views by Day

Views by Video Time

Past Day | Past Week | Past Month | Past Year | All Time | Custom Range

From 02/14/2017 To 03/13/2017

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Overall Summary of User Activity

Access / Date

| 2016-11 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | Total |
|---------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| November | 3 | 6 | 0 | 0 | 0 | 12 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 |
| Guest   | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total   | 3 | 6 | 0 | 0 | 0 | 12 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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

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

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

In terms of teaching of mathematics, I think that I can obtain outcomes that are...
Concept Map Morphology

Concept Maps:

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

Cross Linkage: ---

Diameter = 7

calculation of basic structural parameters

Going beyond the measureable

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

- **Reaction**
- **Learning**
- **Behaviour**
- **Results**
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

EDEN (Education Enquiry Network) 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


Further reading


