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NERUPI Toolkit: Data Collection Strategies – Part 2: Secondary sources

25th April 2024

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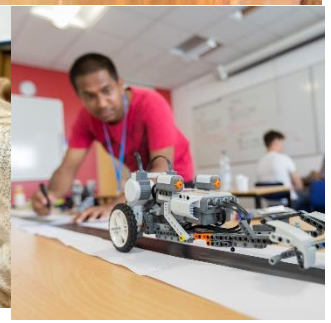

Glossary

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- **Secondary data**
  - Research that relies on existing data – usually collected by someone else – e.g. using administrative datasets (Today's session)
- **Primary data**
  - Research that relies on direct data collection – usually through "fieldwork" - rather than using existing datasets (8th February)

How can secondary sources help us to acquire a better picture and strengthen our evaluations?

Session plan

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1. Introduction
2. Types of secondary data
    - Sources, pros and cons, issues
3. Practice Example
    - University of Kent Student Success
4. Analysing secondary outcome data
    - Some strategies for impact evaluations
5. Signposting to resources

Context

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'Datafication of higher education'

Williamson, B (2018) The Hidden architecture of higher education building a big data infrastructure for the 'smarter university', International Journal of Educational Technology in Higher Education 15 (12): pp 1-26, p.4

Types of data

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Participant data	Engagement data	Feedback data	Outcomes data	Impact data
Are we reaching our target group?	How effective at continuing to engage participants?	What do participants think about it and how do they experience it?	What immediate benefits – resources or 'assets' did the participants gain?	Have the outcomes helped people to change what they do?
What are their characteristics?	How/what extent do they take part?	Are we getting the reaction we want?	How have we influenced what people do in the short and medium term?	What's the long term difference for individuals, groups, communities?
(starting to assess disadvantage)	(starting to consider effectiveness)	(starting to test theory of change)	(starting to capture results)	(starting to identify difference made)

Monitoring → Process → Evaluation

Sources of secondary data in HE

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National Pupil Database (NPD)	Demographics, SEN, FSM, schools attended, attendance, exam results, destinations
UCAS	Applications, Offers, Enrolment
Student records	Demographics, participation, continuation, attainment
Student analytics	Student attendance data, VLE use, assessment (learning gain), attainment data
Student surveys	NSS, UKES, PTES, Welcome/Induction Survey, Career Readiness Survey
Student evaluations	Module/course/programme evaluations, Student Representatives' feedback
Student finance	Bursaries, household income
Other?	Social media comments, official documents, award nominations

New APP targets

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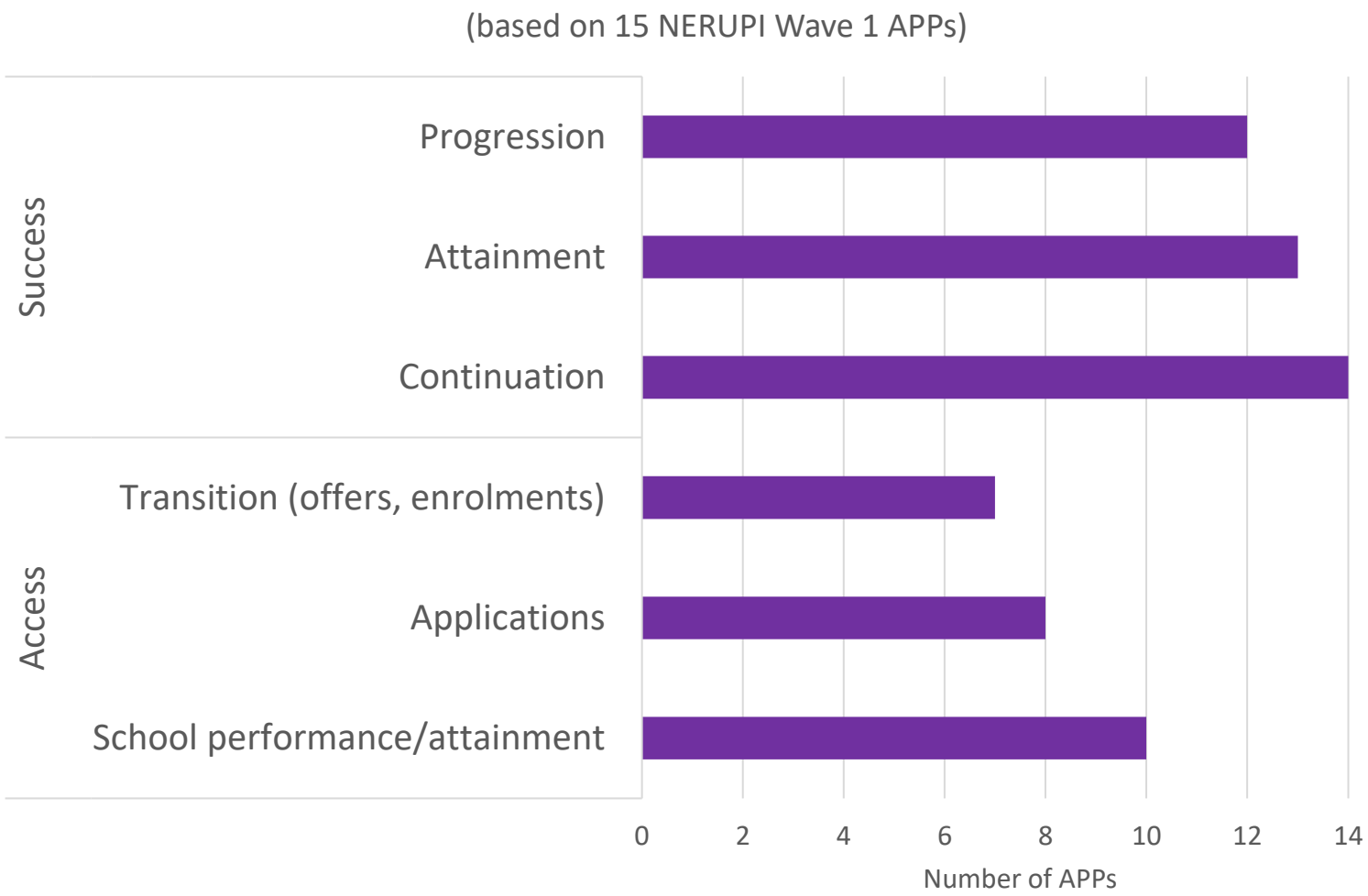

Introductions

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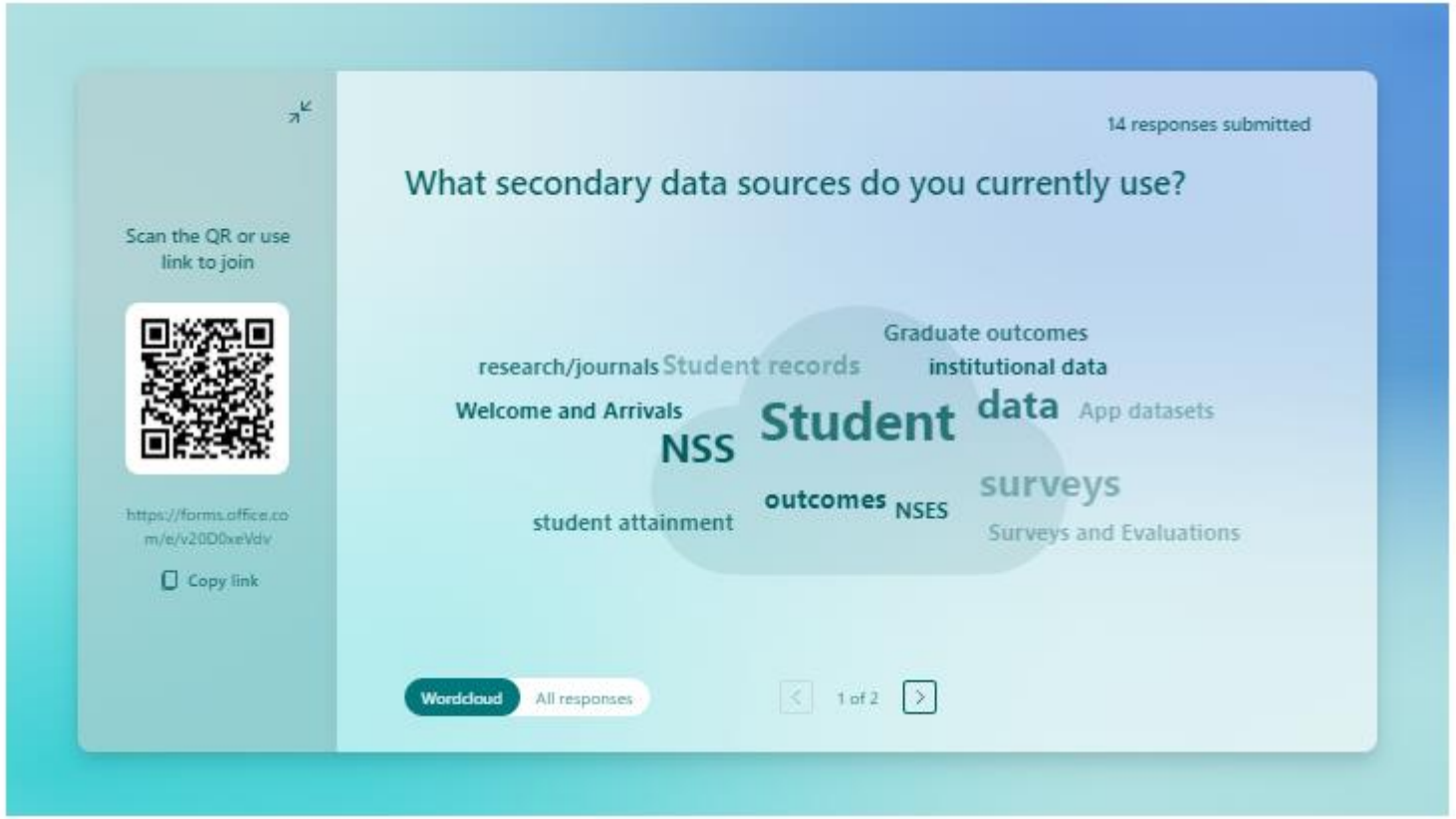
Who currently uses secondary data to evaluate success in access and participation?

What secondary data do you currently use?

What opportunities and challenges do you face?



What opportunities and challenges do you face?

"Knowing the full context of the environment it was collected "
"Delay"
"Lag"
"lack of research in particular areas “
"Data"
"Data sharing "
"Linking datasets "
"Showing causation...or even correlation robustly!"
"Lack of questions regarding wellbeing specifically "
"Data literacy"
"inconsistent data"
"Ethics, systems, standardisation, consistency"
2 of 22 of 2

Benefits of secondary data?

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- Data that has already been collected and may be relevant to the investigation/evaluation

Strengths	Weaknesses
Ease of application Measurable (behavioural/ objective?) Performance criteria Cost effective Facilitates comparative analysis	Relevance issues Summative Narrowness – only pre-collected variables/outcomes Availability (timing) Access issues

Ethical considerations

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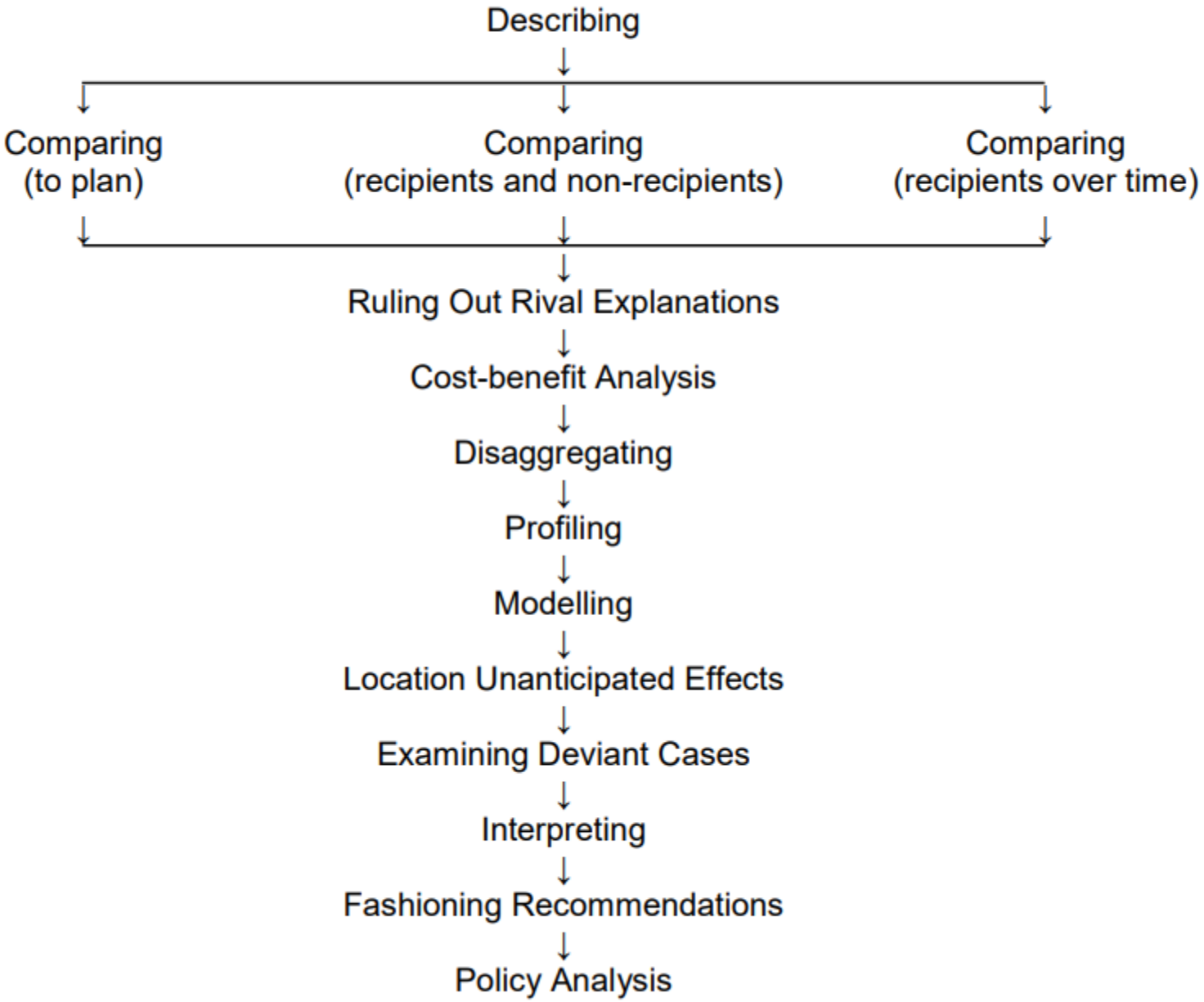
- **How was ethical practice ensured during secondary data collection?**
  - Permission to track
  - Informed consent from participants to have their data analysed for this purpose and right to withdraw
  - GDPR compliance in relation to privacy and data storage
  - Boundaries of confidentiality and anonymity
- **How are participants ensured of ethical scrutiny?**

- **WHY** was the data collected?
- **WHO** collects and stores it? Do they have permissions to share?
- **HOW** was it collected (method, sample etc)?
- **WHAT** are the limitations of the data (source itself and for your research)?

Code of Practice for Learning Analytics - using student data as a basis for action/intervention
www.jisc.ac.uk/guides/code-of-practice-for-learning-analytics

Figure 2 – Logic of Analysis in Evaluation: Quantitative Data



(Weiss 1998b, p.273, figure 12-1)

Secondary data & impact evaluation

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- **Impact evaluation** – assessment of the difference between outcomes with the programme and without,
- The goal of impact evaluation is to measure the difference in a way that can attribute the difference to the programme

➢ **Is this possible?**

‘Requirements’ for impact

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1. For X (a possible cause) and Y (a possible effect) to be in a causal relationship, they must be repeatedly associated. This association must be strong, clearly observable, replicable and it must be specific to X and Y.

2. For X and Y to be in a causal relationship, they must proceed in sequence. X must always precede Y (where they both appear), and the appearance of Y must be safely predictable from the appearance of X.

3. For X and Y to be in a causal relationship, it must have been demonstrated repeatedly that an intervention to change the strength and appearance of X then also strongly and clearly changes the strength and appearance of Y.

4. For X and Y to be in a causal relationship, there must be a coherent mechanism to explain the causal link. This mechanism must be the simplest available without which the evidence cannot be explained. Put another way, if the proposed mechanism were not true then there must be no simpler or equally simple way of explaining the evidence for it.’

Gorard, S. and See, B. (2013) Overcoming Disadvantage in Education, Taylor & Francis, https://books.google.co.uk/books?id=icmAAAAAQBAJ p.65

Use of Comparator groups

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Participant Group

Take part in outreach activity

what happened

Comparator Group

Do not take part in outreach activity

what would have happened

OfS Standards of Evidence	
Type 1	Narrative
Type 2	Empirical
Type 3	Causal

Approaches

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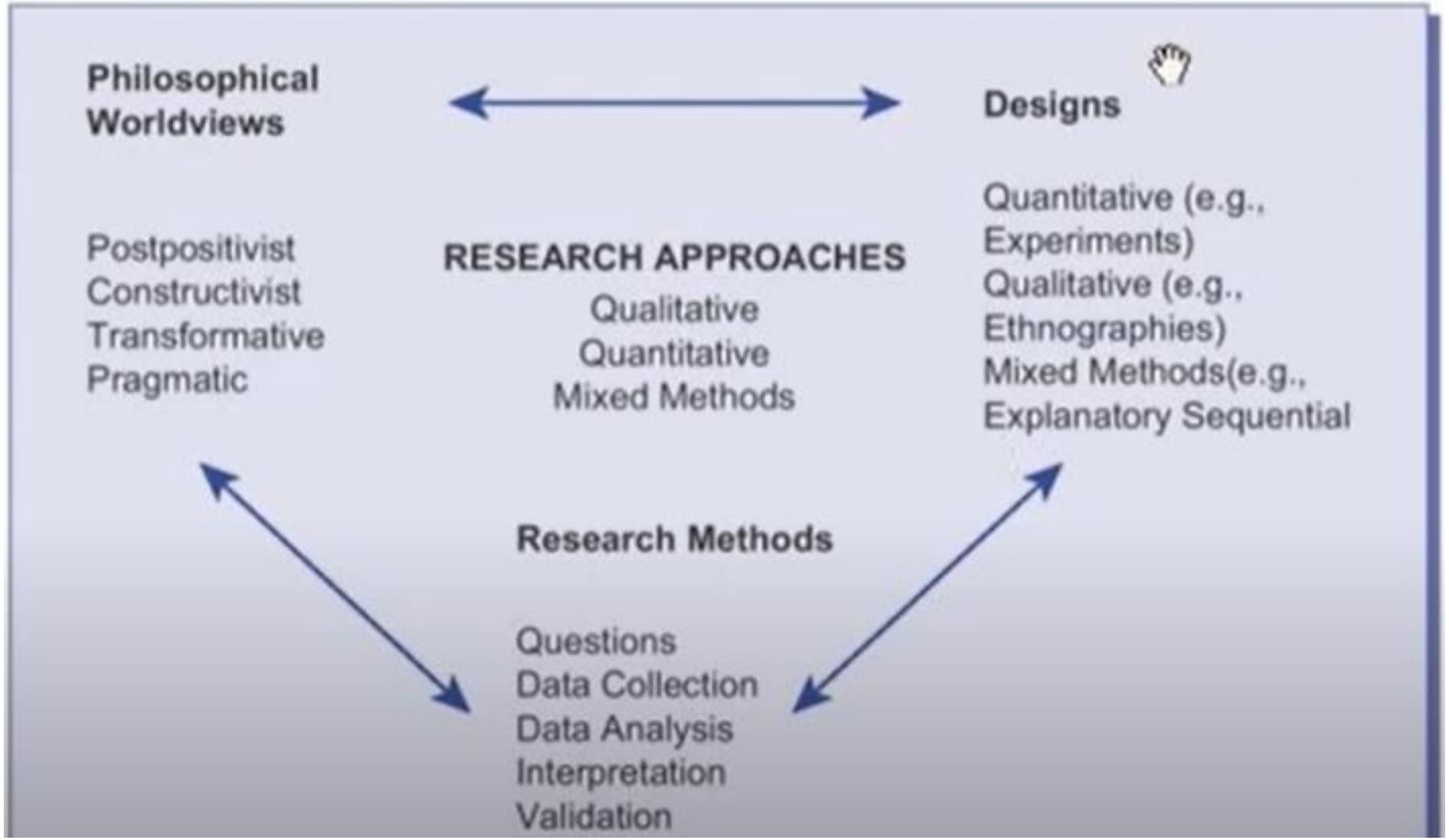
- **Non-experimental** – comparing two groups in the population
  - eg. HEAT Track KS4 report compares participants with their school average (https://heat.ac.uk/how-it-works/tracking-research-and-evidence/)
- **Quasi-experimental** – comparing participants with a specially selected comparator group
  - Examples later…
- **Experimental** – randomly assigning people to a participant and control group (RCT)
  - e.g. TASO-HE Summer School evaluations (https://taso.org.uk/research/current-projects/summer-school-evaluation/)

Conditions

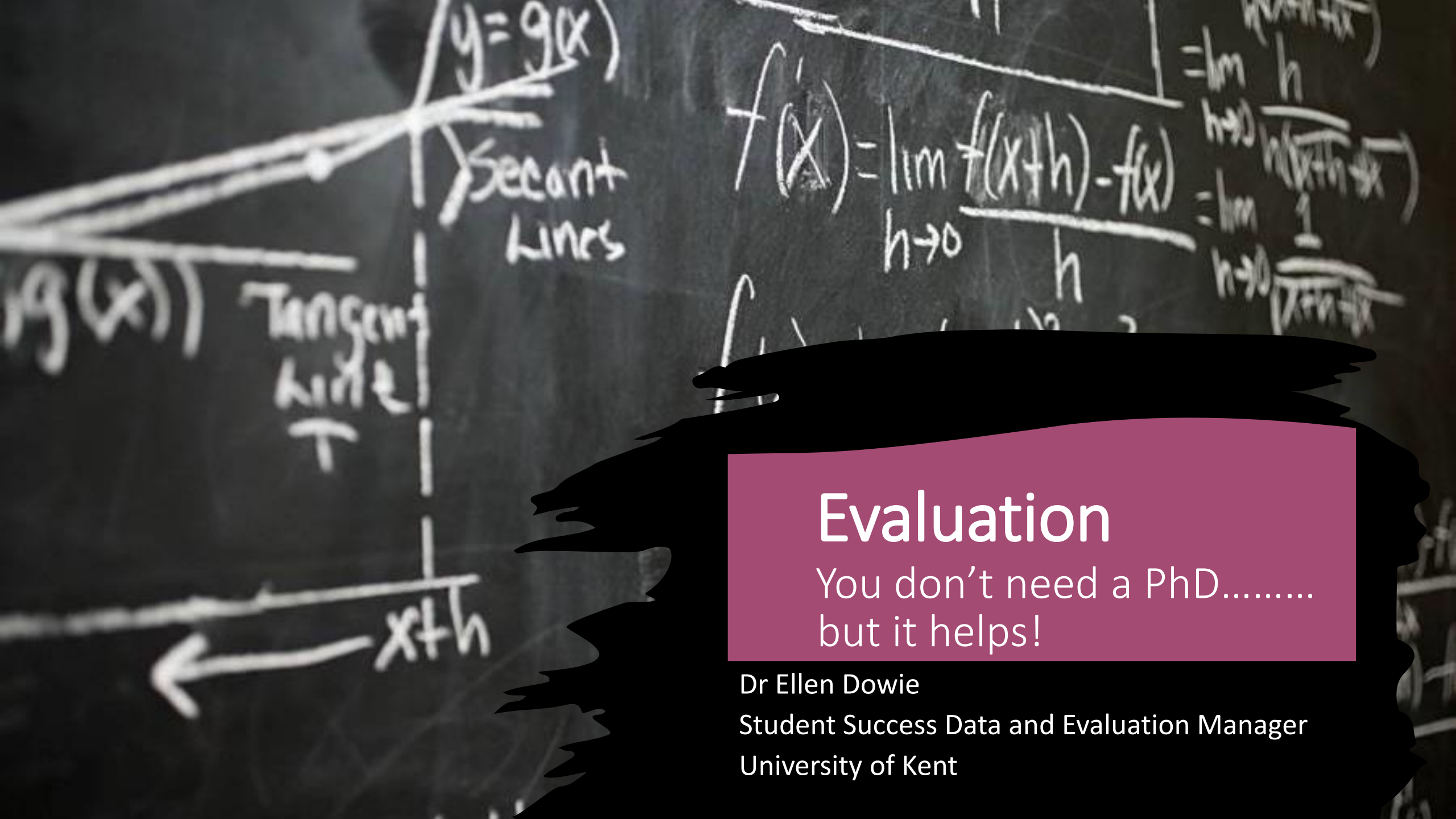
- Explicit underpinning intervention/programme theory
- Avoidance of selection bias

The NERUPI framework works well with mixed methods designs which triangulate and balance evidence

Figure 1.1 A Framework for Research—The Interconnection of Worldviews, Design, and Research Methods



Creswell, J. W. (2014). Research Design: Qualitative, Quantitative and Mixed Methods Approaches (4th ed.). Thousand Oaks, CA: Sage



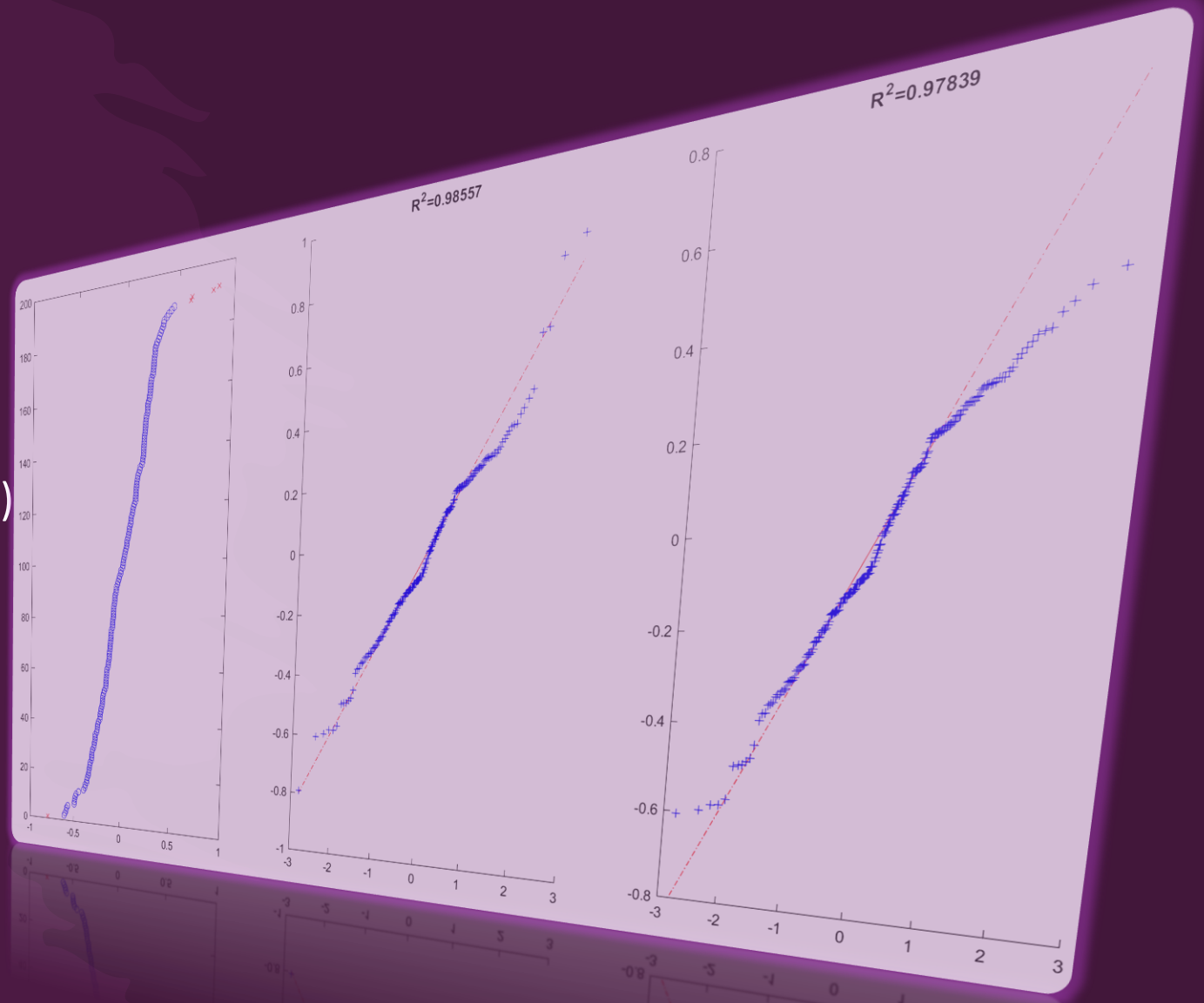
Evaluation

You don't need a PhD…… but it helps!

Dr Ellen Dowie
Student Success Data and Evaluation Manager
University of Kent

Agenda

- Framework development
- Intervention groups
- Mathematical Testing (Secondary Data)
- Contribution Analysis
- Identified Weaknesses
- Identified Benefits
- Questions



Framework development

4 years in the making…

Timeline

Outcomes and interventions	Coding/grouping system	Change measuring	Standardising	Contribution Analysis
• Who was conducting interventions? • What does their local analysis show? • Did their gaps come down?	• What interventions do we see as similar? • Established based on interventions conducted up to 2019/20	• Do students' grades increase more than expected when engaged with interventions? • Introduction of attendance data	• Measure "distance" from the discipline average for each student (Z-score) • Sum Z-scores across disciplines with ease	• Was the outcome observed one intended? • Was a Theory of Change process followed? • Is there qualitative feedback?
➢Comparator group is schools who did not conduct interventions	➢Iteration 1 of identifying themes of interventions	➢Establishing a baseline ➢Stats testing begins	➢normal change in one discipline<>normal change in another	➢Incorporate the mixed-methods approach ➢Generate a causal chain

Intervention groups

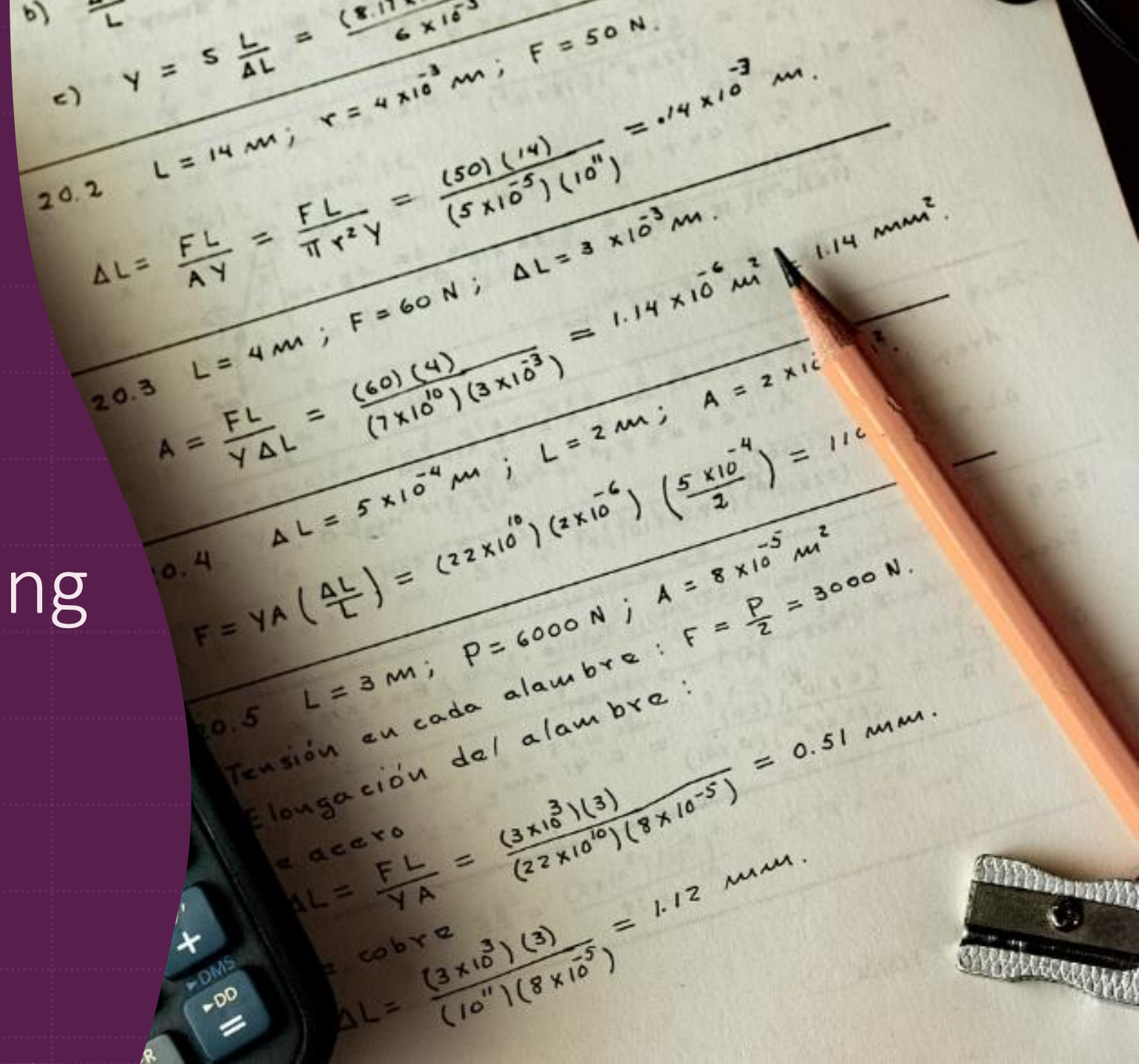
We may need more meerkats…

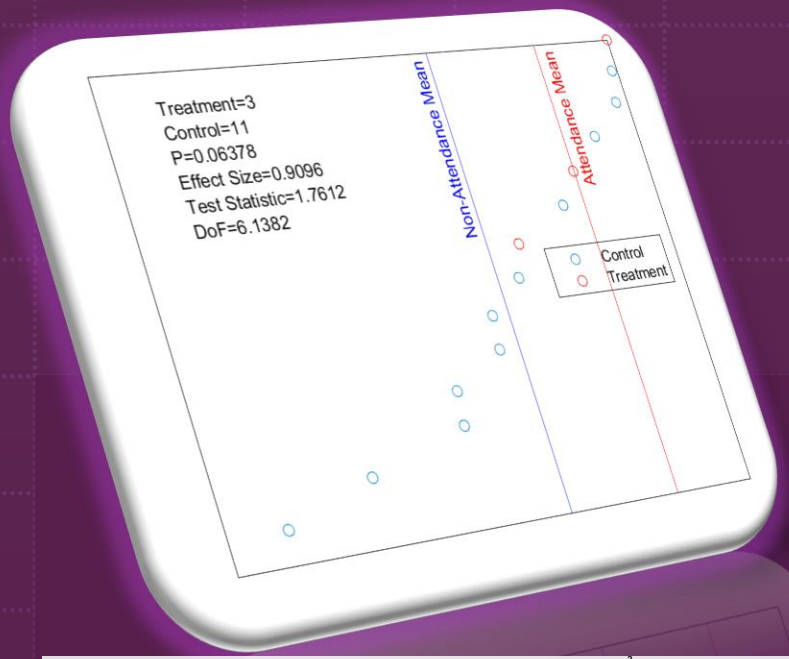
Trying to categorise interventions

Research (no direct outcome)	Research (Code R)				
Staff Awareness	Inclusive teaching practice (Code STA, AF,DM)				
Increasing student attainment	Communications (Code C)	Locally Delivered Workshop (non-modular based)			
	Academic Advising (Code AA)	Coaching Programme			
	Peer mentoring (Code PM)	Locally Delivered 1:1			
	Skills (Code SS)	Locally Delivered Module revision			
Increasing student retention rate: Entry Year Students	Transition/Orientation	Diagnostic tests (that would lead to targeted support)			
	Enrichment/Sense of belonging (Code SP, WWS and IS)	Centrally Delivered (e.g. SLAS/Careers)			
		Locally Delivered Exam prep			
Increasing student retention rate: All Years	Financial Support	Locally Delivered Recap of learning (not revision for exams; in year recap)	Academic Advisor Monitoring System	Diversity Mark	Progression to Graduate Employment workshops (small scale)
	Communications (Code C)	Digital resource access (Moodle or otherwise)	Academic Advisor Delivery Adjustments	TRI Programme	Progression to Graduate Employment conference (large scale)
Increasing student progression rate	Progression (Code P)		Academic Adviser group meetings	Staff Workshop	Centrally delivered Progression to PG workshops (e.g. Careers)
			Academic Adviser 1:1 meetings	Assessment & Feedback	Locally delivered Progression to PG workshops
			Progress Profiles		

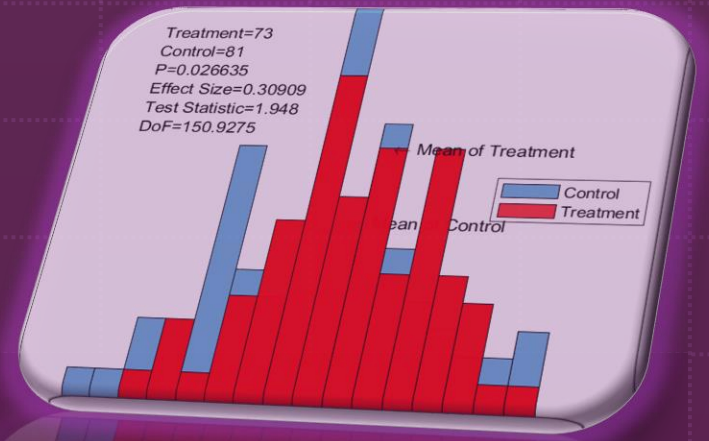
Mathematical Testing

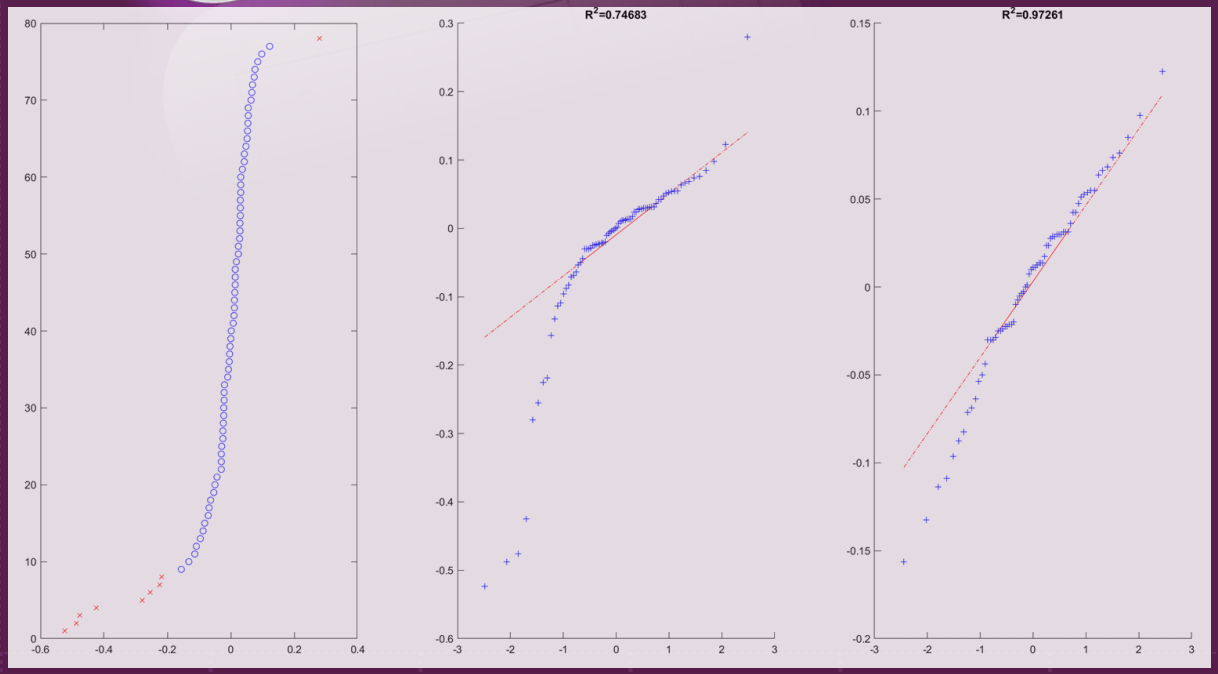
Show your working!





Matlab is your friend

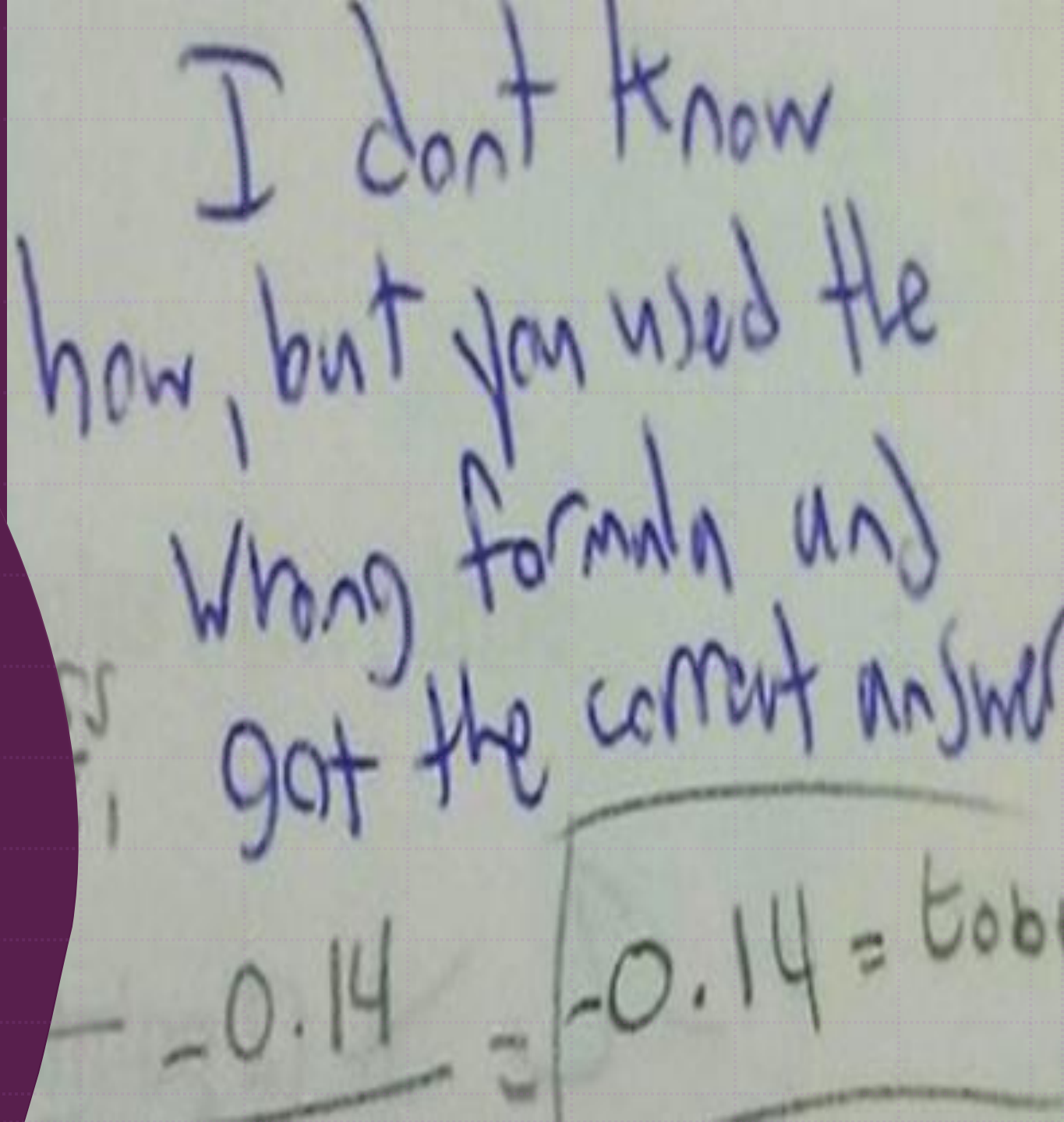




1. Filter for UG UK Domicile students who have progressed from one stage to the next
2. Calculate the change in grade and change in attendance from the current year to the previous year
3. Model each stage and school on attainment and attendance
4. Determine outliers
5. Run the statistical testing
6. Run power testing on statistically significant institutional codes

Contribution Analysis

You saw what you saw and did what you did but did you do what you saw or see what you did?!



Yet another spreadsheet

STUDENT SUCCESS EVALUATION FRAMEWORK

CONTRIBUTION ANALYSIS

Intervention Code	Type of Intervention	Name of Intervention	Division	School	Research theme	Academic Year	Impact Groups Witnessed	Impact Groups Witnessed Broad	Target Group
SS8	Student					2022-23			

Theory of Change assumptions:

Definitions:
Outcomes of interest as those related to the TOC assumptions and resulted from mathematical testing
Parameters
Levels of influence

Did the development intervention influence a change, or did the intervention make an important contribution to a change?

Parameters	Level of influence	Measure (Based in Theory of Change assumptions and processes)	Value	Was the intervention implemented as intended?		Has the intervention reached the target group of students?		How was the intervention experienced both by those implementing it and those who took part in the intervention?	
Certainty	The degree to which observed **outcomes match the expected outcomes.** **Evidence:** *School plans*: rationale/targeting/context/academic engagement/ evaluation methods/monitoring	**Low:** little evidence from the data sources confirm that the observed outcome matches the outcome described in the logic model. **Medium:** evidence confirms that the observed outcomes *match* the expected outcomes as recorded in rationale, targeting, and evaluation methods consistently across the planning process. **High:** it is evident across a range of different data and monitoring sources that the observed outcome matches the one predicted.		Included in the school plan Included in the rationale		Target Group identified They have hit their own target - if not set target at least 10% of target group reached		*Quantitative evidence regarding participation, then Qualitative evidence from either progress reports or SStarT form - relating only to the schools intended targets?*	
Robustness	The intervention is identified as a significant contributor to the **observed outcome**. **Evidence**: *Data spreadsheets;* record of attendance; *SStaRT forms*: challenges, key successes, recommendations	**Low:** across data sources there is limited evidence to show the intervention is a significant contributor to achieving the observed outcomes **Medium:** across data sources there is sufficient evidence that the intervention data have been monitored and recorded as planned and accurately to observe clear changes in expected outcomes **High:** it has noted across all data and evidence sources that the intervention is a significant contributor to the observed outcome		Included in the spreadsheet Included in the SStarT form		At least 10% of the mathematical groups reached (via spreadsheet and/or SStarT form)		*Qualitative evidence from either progress reports or SStarT form - relating only to the mathematical testing intended targets?*	
Prevalence	The degree to which the intervention influenced other areas of implementation of the plan or led to other student success interventions or activities. **Evidence:** *School plans (indicators)*, *Progress reports;* recommendations, lessons learnt	**Low:** the intervention affects limited areas of implementation **Medium:** intervention affects a range of different implementation areas/avenues **High:** intervention affects all different implementation areas/avenues.		Included in School Plan indicators Other areas of implementation		Has the progress report referenced application to other interventions or more than one target group (i.e. more engagement from the other target group than from the control group i.e. if secondary target is Black then comparator White), or reflected in the spreadsheet that engagement is higher		*Quantitative evidence relating to evaluation done by the school in terms of attendance (or attainment if applicable) in relation to mathematical target groups, Qualitative evidence from either progress reports or SStarT form - relating only to the impact on other implementations*	
Range	The degree to which the assumption contributes to a **broad range of outcomes** (impacts on more than one outcome). **Evidence**: *progress reports (across targeted groups and categories)*	**Low:** the intervention affects one outcome of interest **Medium:** intervention affects more than one outcome of interest		Included in a Progress Report Mathematical Impact for school		What areas of impact were found?		*Qualitative evidence from either progress reports or SStarT form - relating only to the other range of outcomes than the mathematical outcome intended?*	

Identified Weaknesses

If you think the rope might break, better to know where its frayed!

It’s only an issue if you don’t admit it

- Only applicable to student interventions
- Unable to use this exact methodology for entrant students
- Assumes that the self-selected engagement is representative of the whole population
- We may remove an outlier/set of outliers that we shouldn’t
- Does not definitively tie to gap reductions but does to grade/attendance improvements
- Assumes little or no colinear behaviour
- That we are dealing with approximately normal distributions

Identified Benefits

Not to blow our own trumpet

but…

Let’s finish on a positive note!

- Side-stepped the ethical issues with RCTs
- CA gets us as close to causality as we can currently reasonably achieve
- We can combine evaluations over schools/divisions/years
- We are following a Theory of Change approach
- We can start to connect interventions that work for certain groups
- The analysis of schools/stages becomes very quick after a few tries
- Graphs produced are a great way to get stakeholders engaged

Questions?

Skip through the evaluation fields knowing it isn’t that bad

Shameless Plug

- Blog Piece
- Pre-print of academic paper
  - Dr Alexandra De La Torre and Dr Ellen Dowie

Comparator group issues

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- Two central problems:
- **Programmes are targeted** – will differ in observable and unobservable ways precisely because the programme intended this
- **Individual participation is (usually) voluntary** – participants will differ from non-participants in observable and unobservable ways

➢ **Hence a comparison of participants and an arbitrary group of non-participants can lead to biased results**

Constructing a comparison group

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- **Randomisation** – randomly assigned to groups
- **Matching** – each participant paired with one or more non-participant based on *observable* characteristics (propensity score matching, case control matching)
- **Regression discontinuity** – counterfactual is individuals just outside the cut-off who did not participate

Dimensions of delivery

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Objectives:
Issues Based

Target:

Specific

e.g. interview training targeted at low SEC students	e.g. academic skills for mature students
e.g. social events for care experienced students	e.g. university trip for Year 7

Universal

Broad based personal development

Variables affecting HE

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- **Prior attainment**
- Gender
- Ethnicity
- POLAR quintile (HE access)
- IMD or IDACI quintile
- Free School Meals
- Parental experience of HE

Associations between characteristics of students (ABCs)
https://www.officeforstudents.org.uk/data-and-analysis/associations-between-characteristics-of-students/

Determining factors of access and equity in higher education: A systematic review - Mega Wanti, Renate Wesselink, Harm Biemans, Perry den Brok, 2022 (sagepub.com)

OfS Financial Support evaluation toolkit

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The tools are:

Survey tool - a set of survey questions →

Statistical tool - a framework for statistical analysis →

Interview tool - a semi-structured interview framework →

https://www.officeforstudents.org.uk/advice-and-guidance/promoting-equal-opportunities/evaluation/financial-support-evaluation-toolkit/statistical-tool/

OfS Financial Support evaluation toolkit

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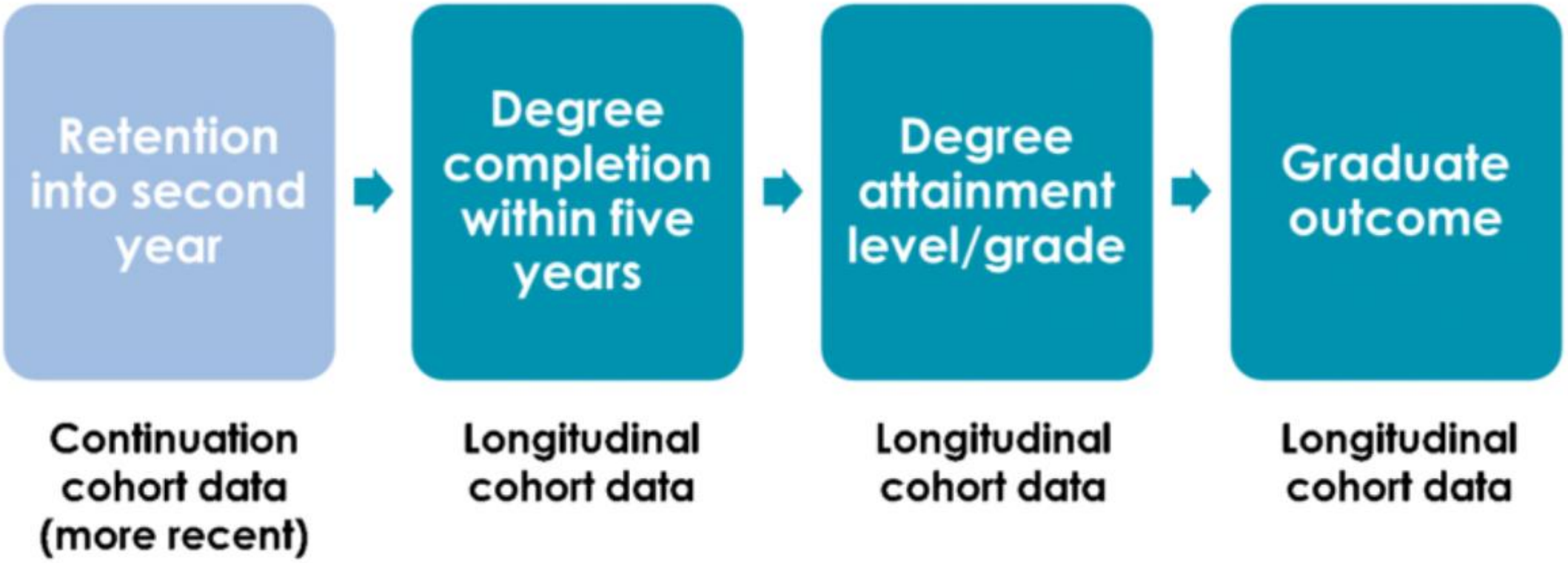

https://www.officeforstudents.org.uk/advice-and-guidance/promoting-equal-opportunities/evaluation/financial-support-evaluation-toolkit/statistical-tool/

Reference group options

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Bursary group	Potential comparison group
All students with a household income of £25,000	Students with household incomes between £25,001 and £42,600 (the upper threshold for the student maintenance grant for 2012 cohort).
Students with a household income of £25,000, but priority given to those from certain geographical areas, but a limited number of bursaries are available.	Students with a household income of £25,000 outside of the target areas and/or those with household incomes between £25,001 and £42,600.
Students meeting specific non-means tested criteria (e.g. ethnicity, care leavers, disabled people, access entry route).	Students with low household incomes who might also be expected to have lower-than-average outcomes.

The results

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Result	What this means
Result 1: Financial support recipients have significantly **better outcomes** than the comparison group.	This indicates that financial support is effective at improving outcomes (and possibly unfairly so with respect to the comparison group).
Result 2: Financial support recipients have the **same outcomes** as the comparison group (i.e. no significant differences).	This indicates that financial support is effective (or there is actually no impact of financial disadvantage on educational outcomes).
Result 3: Financial support recipients have significantly **worse outcomes** than the comparison group.	This indicates that financial support is either ineffective or insufficient to overcome the underlying effects of financial disadvantage.

Logistic Regression Modelling Example 1

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- Extra-curricular activities at NTU (Kerrigan & Manktelow, 2021)
  - Relationship between extra-curricular opportunities and participants' subsequent educational and occupational trajectories.
  - Used grade-based assessment scores, module pass/failure rates, final degree classifications and graduate progression rates to higher study or professional employment
- Participation is positively correlated with improved student outcomes, which holds when controlling for other key factors that influence student success, including gender, ethnicity, disability, age, subject area and pre-entry qualifications.

https://www.ingentaconnect.com/content/openu/jwpll/2021/00000023/00000001/art00007;jsessionid=8p45ii45i5k8a.x-ic-live-02#

Logistic Regression Modelling Example 2

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- UniConnect multi-intervention activities Aimhigher West Midlands (Burgess, Horton and Moores, 2021)
  - All eligible to participate in UniConnect activities but varied or did not participate at all.
  - Outcome measure was UCAS application success (acceptance onto a HE course) (collected via schools).
  - Three categories of independent variables included in this study: Participant-related (sex and ethnicity, deprivation), School-related (urban/rural) and UniConnect Intervention-related (Relative Risk of acceptance associated with increasing number of engagements).
- Engagement was associated with an improved chance of acceptance - type of engagement, extent and combination of engagement all mattered. Benefit beyond five or six engagements was small.
- Large differences in success between schools, even when controlling for several other variables.

Optimising the impact of a multi-intervention outreach programme on progression to higher educat recommendations for future practice and research - PMC (nih.gov)

Evaluation considerations

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Work out project design features that will affect evaluation design:

- Target population and rules of selection
- The roll out plan
- Features and intensity (e.g. delivery modes, resources, different schemes)
- Availability of existing data
- Timing for data collection
- Data quality and variables
- 'Contamination' factors and how to control for these

Narrow down questions for evaluation:

- Questions aimed at measuring impact on a set of 'outcomes'
- Questions aimed at measuring effectiveness of different features/combinations of the project/programme
- Testing hypotheses questions and theory of change

Suggestions

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- If using matched comparator groups understand trade-off between tolerance (similarity of groups) and number of records needed
- Consider motivation when choosing comparator group (hard to control for retrospectively)
- Partnerships needed between practitioners and statisticians
  - Using statistical techniques to control for confounding variables
- Consider cycles of evaluation and use of mixed methods designs
- Remember to be upfront about the limitations of the design in the evaluation write-up

Resources

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- Experimental and quasi-experimental methods https://www.nerupi.co.uk/members/resources/experimental-quasi-experimental-methods
- Options for statistical analysis of pre/post tests and benchmarking https://www.nerupi.co.uk/members/resources/more-on-analysing-quantitative-data/options-for-benchmarking
- Khandker, Koolwal & Sawad (2010) Handbook on Impact Evaluation: Quantitative Methods and Practices, Washington: World Bank
- Bransby, T (2018) Data Fallacies to Avoid: An Illustrated Collection of Mistakes People Often Make When Analyzing Data, Data Science Central www.datasciencecentral.com/profles/blogs/data-fallacies-to-avoid-an-illustrated-collection-of-mistake
- Including Comparator Groups in HEAT's Tracking Reports https://vimeo.com/412251062/82df9543cb