



Video Script: The Power of Sample Size: Part 2

Link to the video: <https://www.youtube.com/watch?v=NeAbxHkvaI0>

STORYBOARD IMAGE

NARRATION

1.



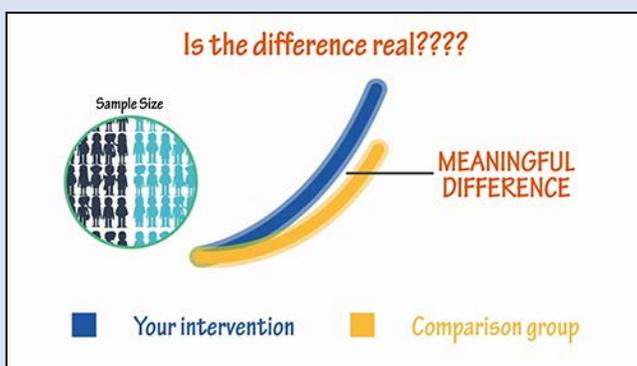
Welcome back to the 5 minute evaluation resource series, ...

2.



This series is designed to help people passionate about education build evidence for educator effectiveness.

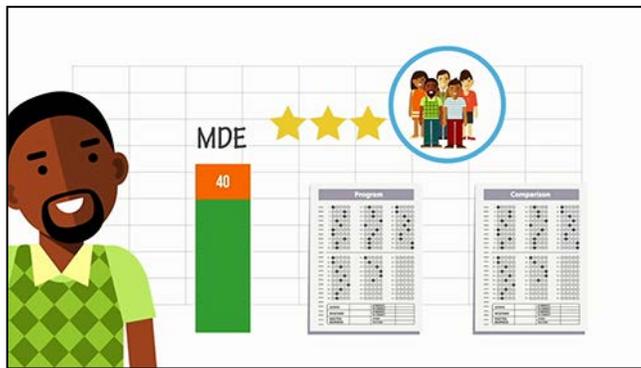
3.



In part 1 of 'The Power of Sample Size' we discussed the importance of having enough people to ensure that your study results are meaningful.

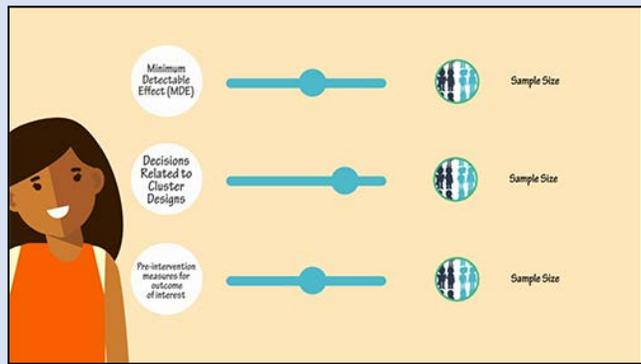


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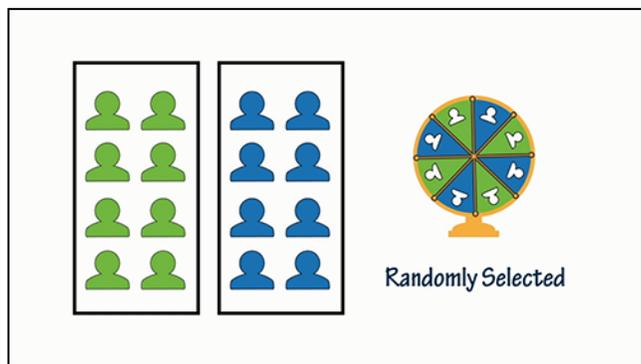
We introduced the concept of the minimum detectable effect, or MDE. The MDE is the smallest impact that your study is designed to find – and it is often based on the smallest change in a key outcome that would be considered meaningful in practice.

5.



In this video, we will discuss how two other aspects of evaluation design can affect your sample size – decisions related to cluster designs and access to measures of student and cluster characteristics that are related to the outcome of interest.

6.



In the example we used in part 1, we based the calculations on an individual-level assignment study design – one that randomly assigns students to a program or a comparison group without considering the students' context.

However, context is often quite important.

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Take the example of teacher effectiveness: studies in this realm almost always account for the fact that students share a host of common experiences with others in their classrooms, schools, and districts that may have nothing to do with the intervention that you are interested in.

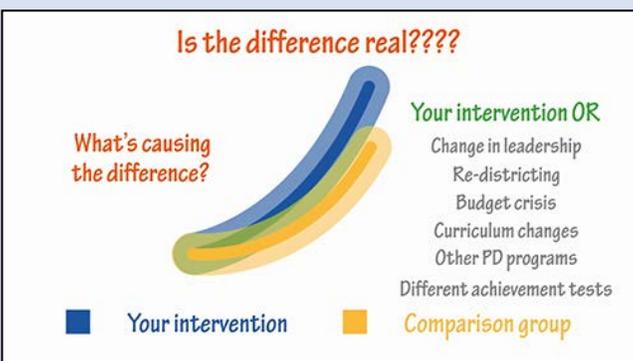


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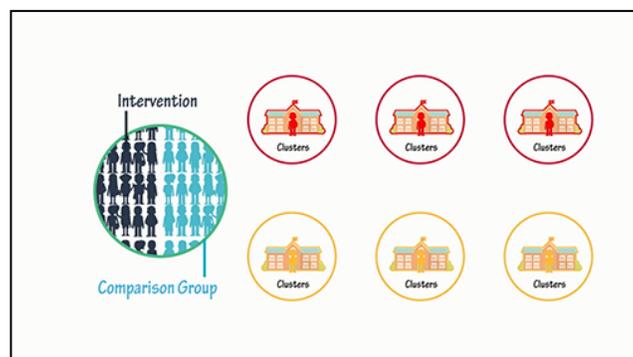
Researchers refer to this as “nesting” of students within classrooms (and classrooms within schools, etc.).

9.



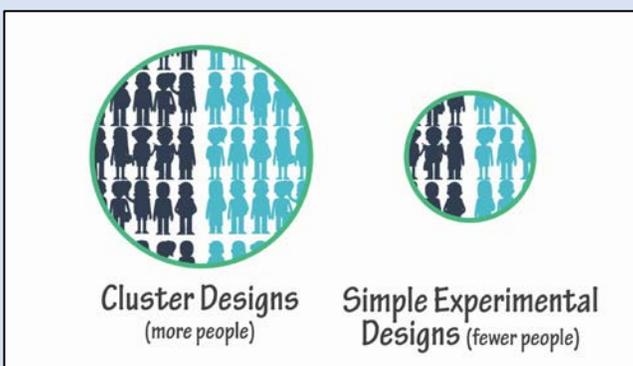
To avoid mistakenly crediting the program for changes in students' outcomes when the change is really caused by something else happening in the wider context...

10.



...study designers can randomly assign clusters (for example whole classrooms or schools) to the intervention or comparison group. These studies are called cluster-level assignment studies.

11.



Cluster-level assignment studies require larger sample sizes than individual assignment studies. Sometimes *much* larger.

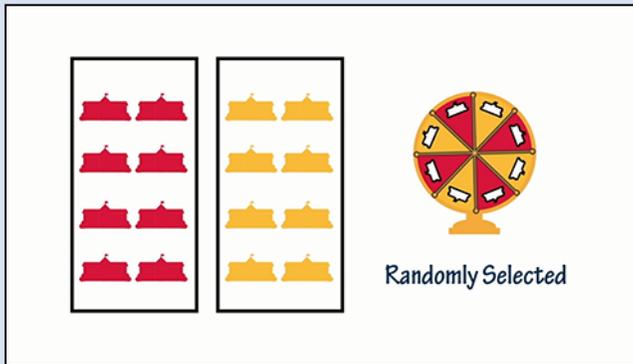


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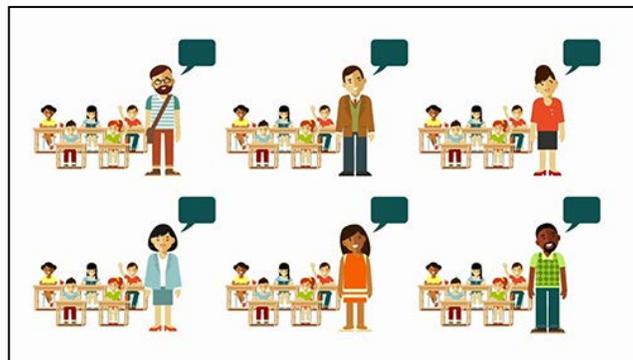
In part I, based on a few assumptions, we calculated that if you randomized individual students to your intervention or comparison group, you would need around 200 students.

13.



Using the same set of assumptions, but randomizing at the cluster level rather than at the individual level, you need a larger sample size to detect the same effects.

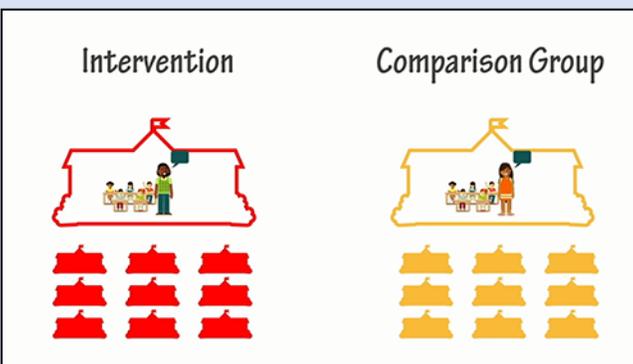
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Here's an example:

Your program is designed to help teachers improve students' math skills. Because teachers often share information with one another within schools...

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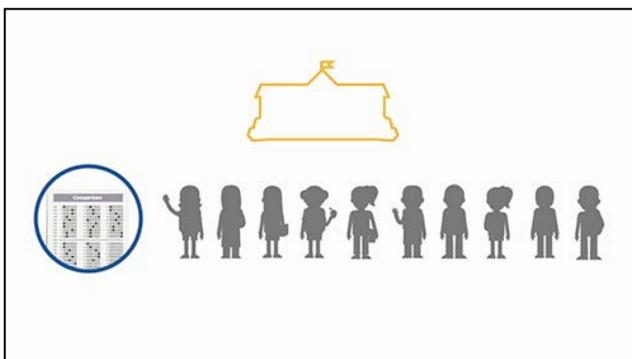


...you decide to randomly assign the schools they teach in to receive your program (the intervention group) or to not receive your program (the comparison group).

The schools, in this case, are the clusters.



16.



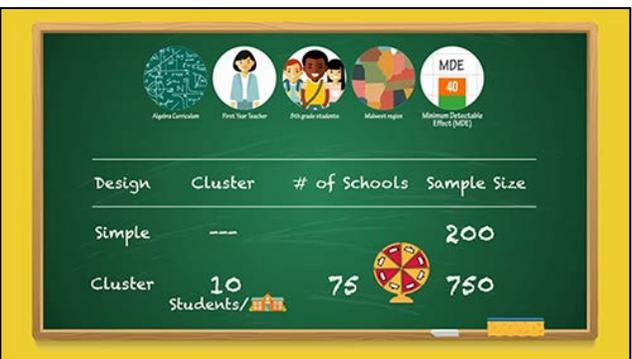
For each school, you will be gathering math scores from about 10 students.

17.



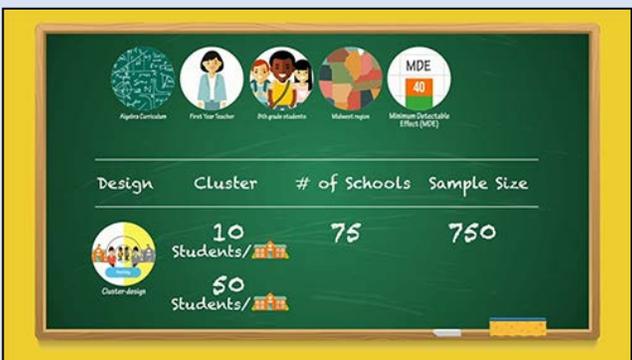
If all assumptions remain the same from our earlier example and the only difference is that we now are gathering data on 10 students within a school that was randomized into the intervention or comparison group, then you will need about 750 students in your study sample instead of 200 that you needed when using the individual assignment study design.

18.



Since you have 10 students per school, that means you will need to randomize at least 75 schools to determine whether your program is making a meaningful difference (roughly 38 schools each to treatment and control conditions).

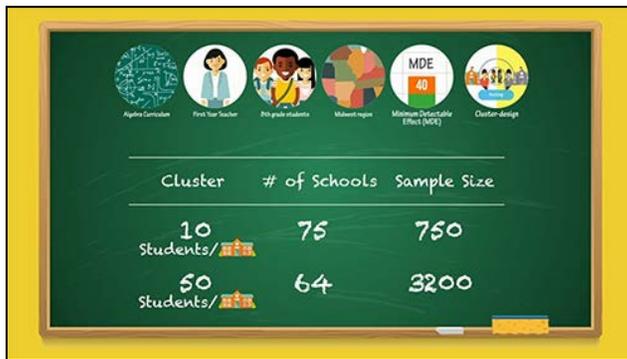
19.



Let's say that instead of 10 students from each school or cluster, you will be able to collect data on an average of 50 students from each school.

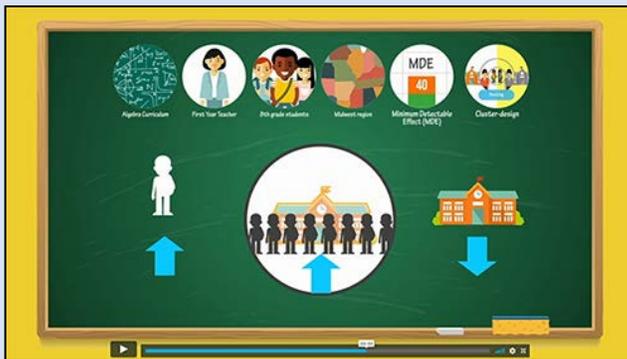


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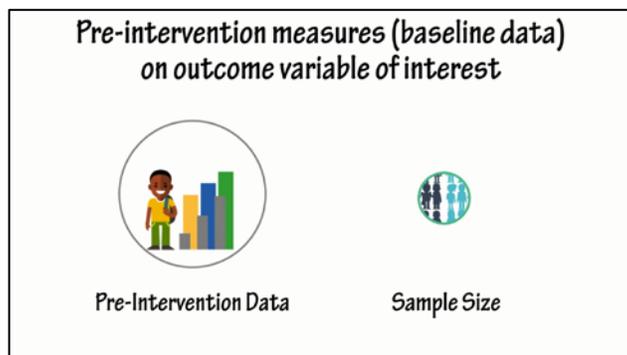
In that case, with all other assumption being the same, the number of students in the study balloons to 3200, but now you need fewer schools –64 instead of 75.

21.



The general rule, then is
As the average number of students within each cluster increases, the total number of students you need in your study will increase, but the number of schools or clusters that you need will decrease.

22.



Let's look at one additional factor that can affect sample size.

When you have pre-intervention data that is highly correlated with your outcome variable, then you can get by with a smaller sample size.

23.



For example, previous test scores are highly predictive of test scores in subsequent years.



24.



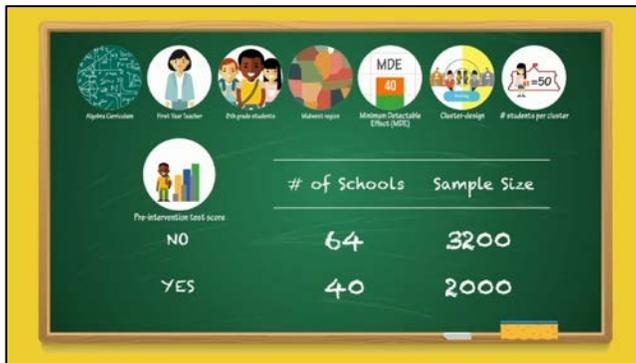
So, If test scores are your outcomes of interest, then knowing pre-test scores makes an enormous difference in the sample size you need.

25.



Staying with the 50 students per school example, let's say you were able to obtain math test scores for all students from the spring before you started your program.

26.



Assuming everything else stays the same, a strong predictor like math pre-test scores (with a correlation of 40% to post-test scores) would lower the number of students you need from 64 schools and 3200 students to 40 schools and 2000 students.

27.



The stronger the relationship of these characteristics is to the outcome of the interest, the smaller sample size you need.

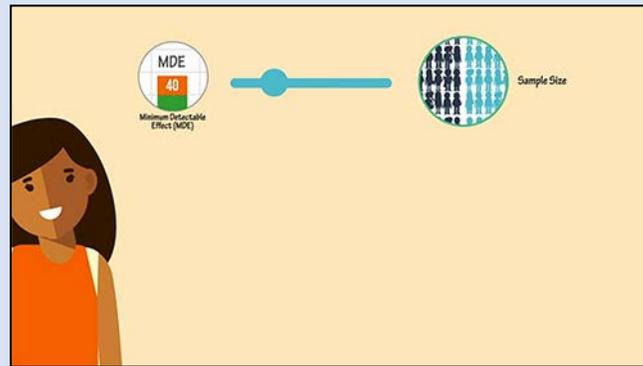


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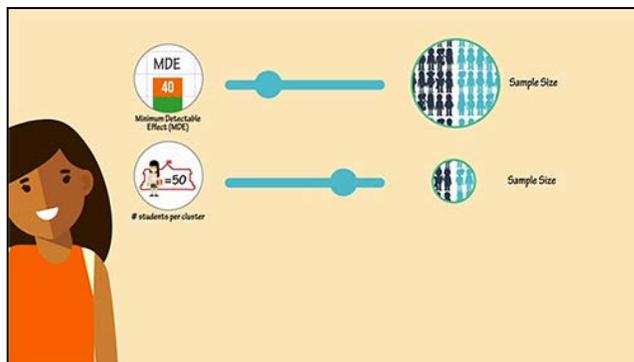
In summary, several factors affect how your evaluator will determine the number of people you need in our study. These factors include

29.



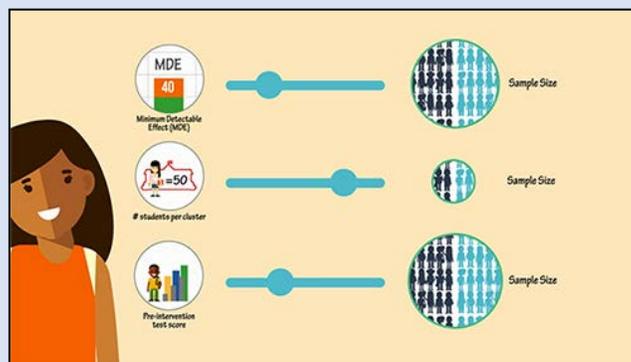
a. The minimum detectable effect. That is, the size of the effect that you expect and need to observe to consider the results meaningful.

30.



b. The average number of students in each cluster (whether the cluster is at the classroom, school, or district level), **and...**

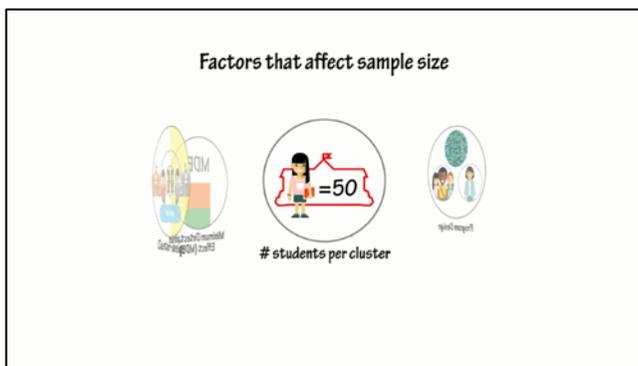
31.



c. The correlation or predictive strength of the pre-intervention data on the outcome of interest that you have for the students in the study.



32.



The bottom line is that the characteristics of your project, the data you have access to, and decisions related to clusters in your evaluation design will affect the sample size required to ensure that your study results are meaningful.

33.



You can work with your evaluator to discuss the best options for your study.

34.



Thanks for watching. Be sure to check out our other 5 minute evaluation resources.

Check out these additional resources:

5-minute evaluation resource series: <https://innovation.ed.gov/what-we-do/teacher-quality/supporting-effective-educator-development-grant-program/building-evidence/>

Evaluation Resource Database: <https://innovation.ed.gov/what-we-do/teacher-quality/supporting-effective-educator-development-grant-program/evaluation-resources/>

Evaluation for Educators—5 minute video: https://www.youtube.com/watch?v=M4f4XD_56hU

Power of Sample Size—Part 1 video: <https://www.youtube.com/watch?v=jW72i8wQZw4>

Innovation Improvement YouTube channel for more videos:
<https://www.youtube.com/channel/UCaDoKAf1atM62kTr8RC1C9A>