CAP Project

Module 2 Video 3 Transcript: Designing Cost Analysis Part 2: Study Design and Analytical Choices

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This is part II of Designing a Cost Analysis in which I will address study design and analytical choices.

In the last video, I showed you this checklist and ran you through 7 items in the first section on *Study motivation and context* and 8 items in the second section covering *Descriptive information about each program being analyzed*.

The last section, *Study design considerations*, includes 18 items - but not every one of them will apply to every study. Still, it's a lot. However, if you take the time up front to think through these issues carefully, you'll be setting yourself up for a high-quality study that's more likely to be of value to your target audience.

Remember that I am using the demo example CAP Project provides comparing costs and effects of Reading Recovery and Fast ForWord Reading to illustrate each point.

The first item to specify is the time period for which data are collected and reported (sometimes called the time horizon) and the specific implementation years. In the Reading Recovery vs. Fast ForWord Reading study, we collected data for the 9-month period between September 2017 and May 2018.

If a program you are studying treats participants over the course of multiple years, you'll need to collect data on resource use for each year and you'll need to pick one year to serve as the reference or "base" year because the value of money changes over time and needs to be standardized. Most often your reference year will be the first year of program implementation. In our study, both programs were implemented over less than one year so we did not need to choose a reference year.

To standardize the value of money, benefits, or effects across years, you need to conduct a calculation called discounting or compounding and must choose an

interest rate called a discount rate for this calculation. For programs operating in the US, we recommend 3% as a standard rate but, if you want to think about it more deeply, there's a link to an article by Mark Moore and others in the readings for this module. We did not need a discount rate for our study.

The next item to think about is the scope of cost data collection. That means, what activities and resources are you trying to put a value on? If the program involves multiple components or serves different types of participants, are you including all of them, or a subset? Are you including start-up costs as well as ongoing costs of program operation? What about any initial development costs or evaluation costs? The answers may depend on who is asking you to execute this analysis and what exactly they want to know. In our case, we were trying to estimate the costs that would be incurred to implement all components of Reading Recovery and Fast ForWord Reading in the school district above and beyond regular school programming.

You also need to figure out whether it is feasible within your study budget to collect cost data from all sites implementing the program or whether you need a sampling strategy. You could choose a random sample of sites, or stratify your sample by geographical location, or grade levels served. Ideally your sample sites should reflect the range of resources used. We were able to collect data from all sites in the district implementing both programs so we did not need any sampling strategy.

You should specify the method you use to collect cost data and to estimate costs. We used the ingredients method developed by Henry Levin which has become the accepted method for estimating the economic costs of educational programs.

You'll also need to plan a timeline for collection of cost data. There is another video in this module on this topic alone. We collected our data between September 2018 and June 2019.

Next, you should identify sources of data on resources used to implement the programs you are studying and also sources of prices you can use to place a value on each resource. Here I've listed our sources of information on the resources used to implement Reading Recovery and Fast ForWord Reading. Some of these items are applicable to many programs – that includes implementation guides, local program evaluation reports, interviews with personnel implementing the

programs, training or other district records, and materials invoices. The last 2 bullets list sources that are specific to these programs.

And here I've listed our sources for prices that we used to assign values to the resources used to implement Reading Recovery and Fast ForWord Reading.

Next, you'll need to plan what kinds of data collection instrument you will use to collect information about resources needed to implement the programs you are studying. This might include surveys, interview and observation protocols, time logs, event logs, or checklists. We designed interview protocols to elicit information from key personnel implementing Reading Recovery and Fast ForWord Reading.

Most programs will use items that last for several years even if the program itself is only implemented for a shorter period of time. These are termed durable assets and might include things like computers or buildings. You can spread the costs of these items over their expected useful lifetime. This is called amortization. We explain the math behind this in the CAP Project Standards and Guidelines, and the CAP Project templates will do the calculations for you. However, you need to decide on a couple of variables. First, when you spread the costs over time, dollar amounts are adjusted to reflect the fact that you could have earned interest on the funds used to purchase the item. You need to pick a formula for this calculation and a suitable interest rate. Second, you need to state how many years you think each type of durable asset will last.

In our study, we used one of the CAP Project Cost Analysis Templates which has built-in interest rates based on US Treasury bond yields. The templates use a continuous compounding formula for amortization which is described in our guidelines. We assumed facilities last 30 years, and computers last 3.

The third item on this slide asks you to identify the method you will use to measure effectiveness if you are doing a cost-effectiveness or cost-benefit analysis. In our example, the district implemented a randomized control trial with Reading Recovery as the treatment and Fast ForWord Reading as the comparison condition.

I'll skip the next item on the checklist which only applies to cost-benefit analysis. A big decision you'll need to make is whether you are using local or national prices

to value each resource or ingredient. Indicate the country to which the prices are applicable and, if you are using local prices, state the locality. We used national US prices for one estimate and local prices from a metropolitan area in Kentucky for a second estimate.

You should state the currency of the prices you are using and the year to which the prices apply. If you use an exchange rate, make sure you state that too. We used 2017 prices in US dollars and did not use any exchange rate.

If you plan to use prices from different years, you'll need an inflation index to adjust them all to the same year. If you need to convert prices from one geographical location to a different location, you'll need a geographical index. For inflation adjustments we used CPI-U –that's the Consumer Price Index for all Urban Consumers provided by the Bureau of Labor Statistics. For geographical adjustments we used the Bureau of Economic Analysis Regional Price Parities. These are both built into the CAP Project Cost Analysis Templates too.

In the design stage, you'll also want to anticipate the summary metrics you will report. In addition, you may want to report some cost breakdowns. In our example, we wanted to present total costs to the district to implement each reading program, average costs per school and per student for each program, incremental costs per school and per student of Reading Recovery above and beyond Fast ForWord Reading, and a cost per standard deviation increase in reading achievement which is a cost-effectiveness ratio. In terms of breakdowns, we planned to look at costs by component, by site, and by resource category.

If you are planning a cost-effectiveness or cost-benefit analysis, you'll need to think carefully about how to ensure your cost metrics are aligned with your outcome metrics. This means making sure that you are capturing the costs to produce the effects observed in the study population. In our study, we gathered costs and effects for the exact same study population, and both costs and effects were estimated for the intent-to-treat sample, that is, all students who were assigned to participate in Reading Recovery or in Fast ForWord Reading.

The final item is to specify the sensitivity analyses you will conduct. This means running some additional analyses in which you vary one or more items in your first analysis to assess how the change affects your results. In practice, you might need to wait until you are already collecting data so you can see where any

uncertainties lie before planning the most useful sensitivity analyses, but there may be some obvious ones you can anticipate. The *Standards for the Economic Evaluation of Educational and Social Programs* has a helpful explanation of types of sensitivity analysis you might run on pages 28 and 29.

In our study, one issue we were uncertain about is how many students in the control schools were using Fast ForWord Reading beyond the 195 participating in the study. If more students were using it, we could spread some of the costs like training for instructional assistants over a larger number of students. So that's one of the sensitivity analyses we planned in advance.

One analysis we do recommend all analysts run is what's called the reference case analysis in which a set of common procedures are used to produce results that are more comparable across programs. The reference case analysis should include costs to *all* stakeholders – that means you'd be adopting a societal perspective. You would use national average prices to value ingredients. And, if you need a discount rate, you would use a rate of 3%. If we all use these parameters for at least one version of our cost analyses, we'll be producing results that help decision-makers compare programs and interventions on an apples-to-apples basis. It also helps developers and researchers when we are trying to assess the cost-effectiveness of the interventions we develop or study relative to other interventions that address the same outcomes.

We've now covered the *entire* checklist of items for designing a cost analysis. You can read more about any of the concepts in this checklist in the *CAP Project Standards and Guidelines* or in the *Standards for the Economic Evaluation of Educational and Social Programs*.