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Discovering recipes for professional learning success: A promising research method

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Scaling up successful professional learning efforts can help ensure that all students experience the benefits of strong instruction. Unfortunately, initiatives with positive results in one setting can fall short in new contexts with different conditions (Hill et al., 2021). In the face of disappointing national achievement trends (National Center for Education Statistics, 2024) we must identify how to spread the bright spots where research-based professional learning is working and do so in context-appropriate ways so that all educators and students can benefit (Brown & Bouffard, 2025).

Building optimal conditions for professional learning that aligns with Learning Forward's (2022) Standards for Professional Learning is complex, ever-evolving work. Meeting the standards requires leaders to make a

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series of choices involving time and resources. As school systems seek to prioritize limited time and funds to enable professional learning, what adaptations can they make to existing research-based designs to maintain alignment with the standards and achieve positive outcomes for the students in their unique contexts? Setting up a series of research experiments on varying professional learning features would provide useful evidence for making decisions, but would take time and resources many school systems don't have.

Another option is to use qualitative comparative analysis, a mixed-methods approach typically used in political science and sociology. It has the power to quickly shed light on how critical factors affect interventions so that leaders can make choices about how to contextualize those interventions. In this article, we describe the benefits of this approach and share examples. Ultimately, we hope this will inspire others to apply the method to educator professional learning and accelerate learning across the sector.

BENEFITS OF QUALITATIVE COMPARATIVE ANALYSIS

Traditional evaluation primarily tells us whether an intervention worked but is less suited to explaining how or why. Consider the example of a train-the-trainer model for a new curriculum. In a set of schools that have opted in and have reserved time during the school day for adult learning, teacher practices and student outcomes improved. But in another set of schools without those conditions, student outcomes did not improve. Are educator buy-in and protected time during the school day responsible for the difference? Are there other combinations of conditions that could work equally well?

A traditional regression analysis could model the independent and interaction effects of each of these elements but requires large samples and has limitations when too many variables are added. Also, regression is not well suited to examining relationships that are not linear (when the outcome does not change by the same amount each time the predictors change by one unit), or when different combinations of predictors could produce the same outcome. This makes it challenging to use regression to examine different conditions and how they affect chances of success.

In contrast, qualitative comparative analysis is a case-based research method designed to analyze causal complexity (Mello, 2021) using a combination of research literature, qualitative data, and quantitative data to identify patterns in the conditions that lead to an outcome. Researchers use it to identify a set of cases that experienced a range of results on the same outcome — some positive and some negative or neutral — and then identify a set of conditions that are likely to influence that outcome by reviewing existing research, interviewing program participants and others with firsthand knowledge, and collecting other types of qualitative data. Next, researchers use a mix of qualitative and quantitative data to identify whether each condition was present in each case. Finally, researchers use a computer program with Boolean algebra to identify the combinations of conditions that led to the outcome.

Because qualitative comparative analysis identifies essential components that are likely to lead to positive impact within specific settings, it is particularly valuable for school and district leaders, whose contexts tend to have unique and varied needs. It can also help educators plan in a resource-scarce reality by identifying tipping points in professional learning. Unlike linear change, tipping points represent thresholds beyond which transformation occurs. A simple example is boiling water: It must reach a certain temperature before it starts boiling. A teacher may need a minimum amount of time to absorb new knowledge and practice it before their students experience any benefits. Using qualitative comparative analysis to identify that point can help us target resources to the places where they'll have the largest impact for students.

Another benefit of this method is the potential to deeply engage practitioners in the research process. Decisions made in this type of research study require in-depth knowledge of the cases being studied. Teachers and leaders can be engaged not simply as research subjects but as active participants in the research process.

However, there are some limitations to consider when applying qualitative comparative analysis to professional learning evaluation. First, the quality of the findings depends on the quality of the decisions made in the original research studies, such as which conditions to include, how to assess whether the outcomes were met, and how to assess whether each condition is present or absent. If the researchers do not have strong knowledge of the context, ultimately the study may miss important attributes.

Additionally, the method cannot identify whether an intervention was effective. Researchers applying qualitative comparative analysis to professional learning should be careful to select an outcome measurement with a clear, direct connection to the intervention (e.g., implementation of a specific instructional practice after a professional learning series on that practice) or a research method that allows causal inference, like a strong quasi-experiment or randomized controlled trial.

AN EXAMPLE OF HOW TO USE QUALITATIVE COMPARATIVE ANALYSIS

To illustrate the process, we reproduce (p. 31) a table summarizing the cases from a 2019 study of a parenting and family strengthening program designed to produce a range of positive outcomes including prevention of teen and young adult substance use and depression (Hill et al., 2019). This type of table is called a truth table. The researchers studied a program that has shown positive results on parenting behavior in randomized experiments and has been widely implemented across the United States with a great degree of variability from site to site. The goal was to identify which components were necessary for the program to be successfully implemented at scale.

The researchers grouped sites as successful or unsuccessful based on growth on a pre- and posttest assessing parenting behaviors. Then they coded each program for whether it included certain key features such as the percentage of practitioners trained, number of families served by each program, fidelity to program content, and parent engagement in the program. The researchers examined available data and research to identify clear rules to judge whether each feature was present or absent, and then coded each site as 1 if that rule was met, and 0 if it was not. They then looked for patterns in the data using software designed for this purpose.

In their analysis of the truth table, the researchers found three conditions that were present in all of the successful programs and therefore were considered necessary conditions: at least 75% of practitioners were trained, programs served fewer than 12 families, and site directors rated participating parents as "very engaged" or "extremely engaged" on a 5-point scale.

The researchers also identified two sets of sufficient conditions, which means when one of the two sets of conditions was present alongside the necessary conditions the outcome was successful. In other words, these were two different pathways by which success could be achieved. In the first pathway, they met the three necessary conditions, offered an orientation night, and collected high quality data but did not show high fidelity to program content. In the second set, successful programs not only met the three necessary conditions but also were of a sufficient size (not fewer than eight families) and collected high-quality data.

Based on these results, the researchers suggested organizations looking to implement this program should be sure the three necessary conditions are always present, but that other features can be adapted to local contexts using a combination of the sufficient conditions. This allows future implementers to know where to focus and where to be flexible.

QUALITATIVE COMPARATIVE ANALYSIS IN PROFESSIONAL LEARNING

We are currently applying a similar approach in our work in schools. At Leading Educators, we work with school systems to offer direct support to teachers and leaders and strengthen the working conditions that enable schools to continuously and sustainably improve their impact on student outcomes. In alignment with research on teacher professional learning, our work is customized to our partners' high-quality curricula and a strong vision of excellent teaching and learning, and has yielded encouraging results (Audisio et al., 2024; Mihaly et al., 2022). Our partnerships with school systems vary across geographies and over time based on the partner's context, resources, and curriculum implementation stage.

Program	Orientation night	Too small	Too big	Parents engaged	Practioners trained	Fidelity to content	Practicioners' data quality	Successful outcome
Successful programs								
1	*1*	0	**0**	**1**	**1**	*0*	*1*	1
2	*1*	1	**0**	**1**	**1**	*0*	*1*	1
3	*1*	0	**0**	**1**	**1**	*0*	*1*	1
4	1	*0*	**0**	**1**	**1**	1	*1*	1
5	0	*0*	**0**	**1**	**1**	1	*1*	1
6	1	*0*	**0**	**1**	**1**	1	*1*	1
7	0	1	**0**	**1**	**1**	1	1	1
8	0	1	**0**	**1**	**1**	0	1	1
9	0	1	**0**	**1**	**1**	1	0	1
Unsuccessful programs								
10	1	1	**0**	**1**	**1**	1	0	0
11	1	1	**0**	**1**	**1**	1	1	0
12	0	0	**1**	**1**	**1**	1	0	0
13	0	1	**0**	**1**	**1**	0	1	0
14	0	1	**0**	**1**	**1**	1	1	0
15	0	0	**1**	**1**	**1**	1	0	0
16	0	1	**0**	**1**	**1**	1	0	0
17	0	1	**0**	1	**1**	1	0	0
18	0	1	**0**	**1**	**1**	1	0	0
19	0	1	**0**	**1**	**0**	1	1	0
20	0	1	**0**	**0**	**1**	1	1	0

Necessary conditions are in bold. Program sites are sorted so the identical configurations are contiguous. The two sets of sufficient conditions (sites 1-3 and 4-6) are italicized.

Reprinted with permission from Hill et al. (2019).

We and our partners have recognized the need for stronger evidence on how to achieve sustainable practice changes that improve student learning within varying contexts. To address this need, we designed and launched Recipes for Impact, a study funded by the Research Partnership for Professional Learning that uses qualitative comparative analysis. Comparing cases from our work over an eight-year period, we will identify necessary and sufficient conditions that constitute multiple pathways to achieve student outcomes through curriculum-based professional learning. These pathways will serve as "recipes" for future professional learning initiatives in real-world contexts. By systematically analyzing how different program components interact, we aim to refine our approach and provide evidence-based recommendations for scaling professional learning efforts that maximize student outcomes.

This study compares about 20 cases of Leading Educators' work across the U.S. from 2016 to 2024. Each case has a completed program evaluation using quasi-experimental or experimental methods aligned to Tier 3 or above of the Every Student Succeeds Act evidence standards (U.S. Department of Education, n.d.). We used the results of these evaluations to determine whether cases had a successful student learning outcome.

Next we selected the conditions to study, asking: What conditions were similar and different across these cases that may explain differences in impact? With a panel of program, school, and system leaders with in-depth knowledge of the cases, input from leaders, and a review of existing research, we prioritized the conditions to study. Currently, we are identifying decision rules for connecting the concepts with numerical values. For example, to categorize cases as receiving low, medium, or high levels of coaching, we will identify numerical thresholds for key aspects such as number of hours and number of different roles receiving coaching.

After finalizing the conditions, we will construct a truth table that

BENEFITS OF QUALITATIVE COMPARATIVE ANALYSIS

- Explores causality in complex systems where there can be multiple pathways to success
- Acknowledges unique and varied needs of schools
- Leverages insights from both successful and unsuccessful initiatives
- Opens the door to practitioners' deep engagement in the research process
- Helps identify "tipping points" or minimum levels of intervention needed, helping school systems maximize scarce resources

compares the features, conditions, and/or amount of professional learning in each case and identify conditions that are either necessary (i.e., the outcome was not achieved without it) or sufficient (i.e., the outcome always occurs if present). Results from the study will be available in late summer of 2025.

Some example questions we hope to address include:

- How many stakeholders (e.g., district leaders, principals, coaches, professional learning community leaders, teachers) should a professional learning initiative include to maximize the chances of success?
- What is the dosage (e.g., hours per year) of coaching or other professional learning that is likely sufficient to produce outcomes for students?
- What combination of components in the first year of curriculum implementation is most common in successful schools? What combination is needed in the second year or beyond?
- Which conditions appear to be neither necessary nor sufficient to produce an outcome, and so could be deprioritized by systems making tough decisions about limited resources?
- Which school and system conditions are most important to prioritize first, as the data suggests improvements are unlikely to be achieved without them?

A CALL TO ACTION

School and system leaders are confronting the complex reality of limited and uncertain funding while trying to address student achievement levels that have not rebounded from pandemic lows. The ability to make strategic decisions on how to design professional learning with less than ideal conditions is more important than ever. Impactful professional learning must not be rare or restricted to systems with the resources to achieve optimal conditions. As a result of our study, educators and policymakers will have access to critical information on how to customize program design and delivery to meet specific needs without compromising core research-backed components.

We are sharing the design and benefits of this study while it is in progress with the hope of inspiring others to design and implement similar evaluations. Ongoing research using qualitative comparative analysis will help the field learn from both successes and failures to refine professional learning initiatives, ensuring professional learning efforts remain both evidence-based and adaptable to the shifting needs of schools and students.

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