
INTRODUCTION

Design Development and Innovative School Improvement

It may be hard for an egg to turn into a bird. It would be a jolly sight harder for it to learn to fly while remaining an egg. We are like eggs at present. And you cannot go on indefinitely being just an ordinary, decent egg. We must be hatched or go bad.

—C. S. LEWIS

We live in an inequitable society, and our educational system insufficiently answers to the needs of disadvantaged and marginalized students. Too often, educational systems ignore or avoid problems of inequity or address them superficially. There are several reasons for this failure. Acknowledging problems of inequity often causes discomfort for those who have tolerated the status quo for too long. It stirs up political conflict with those who have benefited from inequities, and it creates value dissonance among those who believe that things are right the way they are. Moreover, equity-relevant improvements in education are complex: they entail technical innovation, moral reorientation, political struggle, motivation, risk-taking, and courage. Thus, efforts to achieve these improvements must consider technical, political, and normative aspects of change, and education leaders who are focused on equity need to recognize their own transformative role.¹

Transformative leaders for equity in education face three interrelated core problems:

- how to *make their organization more effective* so that scarce available resources are used to benefit the students;
- how to enable their organization to *facilitate complex learning* so that all students are exposed to learning opportunities that treat them as intellectually and morally capable persons;
- how to insure that all adult members of their organization *value students equally* so that differences in ethnicity, race, gender, class, sexual orientation, language, immigrant status, or special needs designation do not result in value judgments detrimental to students' dignity, competence, and well-being.

Each of these core challenges entails different dynamics of organizational change. Improvements in *organizational effectiveness* often revolve around coordination, coherence, and follow-through. Improvements in *learning complexity* often home in on capacity building, commitment, and autonomy. *Cultural change for equity* needs to address value dissonance, courageous collegial conversations, and moral leadership.

Equity-relevant improvements are about what schools value, but also about what works. To clarify what their schools value, educators need philosophy and deliberate reasoning. An understanding of what works, however, requires several types of knowledge. For most school leaders, experience and common sense loom large. Fortunately, professionals can also draw from a developed knowledge base on school improvement. But the available knowledge base has its limitations. Studies of effective schools and teaching reveal factors associated with better student outcomes. This body of knowledge, however, does not describe how to create these conditions in challenging environments. Other studies evaluate the effectiveness of certain interventions or programs by rigorously comparing treatment and control groups. These kinds of evaluations, however, leave the challenge of implementing the programs in local contexts as a black box. There is an ample body of case studies that demonstrate how policies or programs were implemented

and how changes unfolded within the complexity of educational organizations. This body of knowledge, unfortunately, tends to show how the intended changes did not unfold and tells us too little about how change might unfold successfully in educators' own schools and districts. Finally, a body of improvement theories and how-to guides too often lacks a strong and systematic evidentiary base.

In sum, we know too little about how equity-minded leaders act on their values through practical interventions *and* make them work within their organizations. For this, we need a different kind of knowledge: practical design knowledge. Practical design knowledge is knowledge about what to do or how to intervene when one encounters recognizable problems in one's work. It is design knowledge because it is explicit and spells out the main steps in a sequence of activities and the main content of these activities. It is practical because it is sufficiently concrete so that people can make connections between their experiences of problems and what the design of a solution suggests for them to do. Most teachers are familiar with curricular unit plan documents that show them what and how to teach when they face a specific teaching challenge, for example, how to make students understand a certain concept, such as the "main idea" in a text. These unit plans map main lessons, activities, materials, and perhaps even main prompts or forms of interaction between teachers and students. The interplay of these elements is a design.

But how does a design come about? Sometimes it is the result of trial and error by teachers who tinker with the best way to teach a focal concept. Sometimes it is the result of more systematic research. Sometimes teachers and researchers work together and try out activities, carefully recording how students respond. They engage in what we call design studies or design development studies. These kinds of studies are also useful for the purpose of school improvement, and they are especially useful for thorny problems of improving on equity. Design development marries the values and ideals of visionary leaders with the evidence that their efforts worked. But designs should not be seen as prescriptions. Many educators have heard of, or are familiar with, scripted curricula. They are a form of instructional design that tells users to implement the script with fidelity, step-by-step, glued to the pacing, prompts, and materials of the script. The designs we have in mind in this book are different.

Against the idea of implementation fidelity, the type of design development for school improvement advocated in this book assumes the autonomy of participants. Less concerned about universal effectiveness or broad generalization across large populations of schools, design development of the sort advocated in this book builds on the idea that context sensitivity is the base of all successful improvement, that educational leaders will need to adapt and reinvent for their specific situation, but that design principles can travel. In a nutshell, design development is a systematic and disciplined form of innovative problem solving in educational organizations. It is informed by clear, thoughtful ideas about the adult learning that is needed to accomplish intended results. Design development considers the complexity of specific organizational contexts, employs both the predictive quality of research and the creative power of practical problem-solving, and achieves results iteratively, in trial-and-error fashion.

This book is meant to be a practical guide for educational leaders who strive to contribute to the emerging body of practical design knowledge for school improvement.

A NEW APPROACH TO INNOVATION AND PROBLEM SOLVING

One of the most important competencies of leaders everywhere, but especially of educational professionals serving disadvantaged students, is to make good decisions. Decisions at senior levels in school districts and similar organizations can affect large numbers of people and have far-reaching consequences, but even decisions at a medium-sized school can affect many people. The quality of these decisions is gauged by the degree to which they are informed, reflective, adequate to the situation, effective, sensitive to client needs, and in the service of equitable learning opportunities.

While many decisions are minor and made in a flash of recognizing past experiences in present situations, some are bigger. Some big decisions deal with programmatic directions and strategic orientations of an organization. For example, what should we do about the numerous disciplinary referrals and suspensions in our middle schools; what should we do about widespread bullying behavior in our

high schools; how could we upgrade the quality of our principals' instructional supervision so that they are prepared to lead their teachers toward teaching college-ready skills and knowledge? Other major decisions are made at the school level. For example, how can we overcome the exclusion of students with disability from grade-level content, or how can we keep our teachers from over-referring students of color to special education? These sorts of problems recur in many school systems all over the country, and they demand that leaders be innovative problem solvers, programmatically and strategically.

If innovation means the application of new inventions or ideas to existing organizational processes to make these processes more efficient, more sensitive to client needs, or more likely to have better results, then many educational organizations operate in a curious mode of innovation. When leaders sense one of the bigger problems mentioned above, their search for solutions often goes outward. They scan the environment for programs, consultants, or packages that seemingly address the problem. Their preference is to find solutions that carry the label "research-based" or "best practice." Solving the problem then becomes a matter of implementing a package, a script, or a consultant's directions—solutions that have a supposedly proven record of success. Innovation is all about buying the package and, afterward, creating buy-in for it. There is nothing wrong with this *buy and buy-in* mode of innovation if the new program addresses a clear problem, has a record of success, is a good fit with existing beliefs and practices, and is given sufficient attention, resources, and time for implementation.

The drawbacks of this mode of innovation are apparent. Leaders often overestimate the effectiveness of these new programs and underestimate the challenges of implementation in their unique local situations. As attention shifts from one problem to the next, multiple packages accumulate, each with its own set of commands, unique vocabulary, and demands on teachers' time. Incoherence and bad fit with internal beliefs, attitudes, and practices diminish teachers' energy and commitment to learn. The adopted solutions tend to be conventional, rather than innovative or creative. Whether the solutions actually work is often overlooked and seems to count less than whether they give the appearance that the leaders have done their job and addressed the problem.

This book asks educational leaders to think about innovation and problem solving differently. We ask leaders to engage with the design mode of innovation. The design mode goes beyond the simplicity of *buy and buy-in*. It aims at innovative interventions for problems that do not come with a ready-to-buy solution. This mode of innovation begins with the assumption that educational settings are complex; that much of educational change is about adult—and, ultimately, student—learning; and that this learning and its results are emergent, that is, they are not narrowly predictable, but are not completely open-ended, either. In the design mode, interventions are sets of sequenced learning opportunities that are created *iteratively* and repeated through trial and error until a satisfactory outcome has been accomplished. When designers engage in this trial and error, they are acting creatively. But they do not act arbitrarily. Rather, the process is a systematic and disciplined undertaking. What it takes to make it so is the subject of this book.

THEORETICAL AND EMPIRICAL FOUNDATION OF THE BOOK

In 2006, the Graduate School of Education at the University of California, Berkeley, started a new doctoral program for working professionals. From its inception, the Leadership for Educational Equity Program (LEEP) followed the guiding ideas of the Carnegie Project on the Education Doctorate to develop the EdD as a professional doctorate framed around key principles associated with the preparation of “scholarly practitioners.”²² These principles include a commitment to transformative leadership in service of equity and social justice, a focus on analyzing problems of practice and developing meaningful solutions, and a grounding in a knowledge base that integrates practical and theoretical research knowledge. With these principles in mind, LEEP saw the potential of design development methodology as the signature pedagogy for the practice-oriented educational doctorate. Program participants have been mostly school and district administrators, ranging from superintendents to principals, assistant principals, and department heads in public school districts, Catholic dioceses, and charter school units. The

program gave my colleagues and me the basis for our experiments with design development in many contexts and related to a variety of problems.

The work is a team effort. As the main author of this book, I was the founding director of LEEP and initiated experimentation with design-based thinking and research from the program's inception. My colleagues and I inherited ideas that Bernard Gifford had developed for an earlier version of leadership development at Berkeley. Cynthia Coburn was a contributor and teacher in the program for the first few years. Her thinking about the connection between research and practice has given us founding ideas. We have benefited from the intellectual commitment of eight cohorts of educational leaders, whose work is acknowledged at the end of the book. Over the years, the core development team has consisted of the program director, four educational leaders (Elizabeth Baham, Annie Johnston, Page Tompkins, and Matthew Wayne), and three university-based young scholars (Mahua Baral, John Hall, and Elizabeth Zumpe). Our work has benefited from the support and critical feedback of over thirty-five members of the Berkeley faculty from nine departments.

Starting in 2006, we tinkered. As behooves design thinkers, we tried many things and failed often. In the last few years, we have become firmer in our knowledge on how to effectively communicate design-based thinking to educational leaders who are, or want to be, transformative leaders for equity. We began a systematic self-evaluation of projects, and our students have graciously allowed us to take a closer look at their progress as they wend their ways through the milestones of developing their research. Because our program is small, the number of students who have completed design development studies is still small, but we make up for it with detailed data collection on the unfolding of their thinking.

The literature on design experiments, design studies, or design development is quite extensive, and in writing this book, my colleagues and I have consulted much of it. Several sources that inspired our thinking deserve special mention.

The initial inspiration came from the work of the late Ann Brown and from that of Paul Cobb and his coauthors.³ These scholars provided the theoretical underpinnings of design-based research in the learning sciences. Their work emphasizes theory development. Our emphasis, in contrast, is on results: designs that improve

schools and school districts or similar administrative units.⁴ The work of a team of researchers and designers at the Netherlands Institute for Curriculum Development (SLO) at the University of Twente gave us a theoretical and practical methodology that suited the work of educational leaders charged to improve their organization.⁵ Their work has spawned an impressive wave of design research projects internationally. A compelling book by David Coghlan and Teresa Brannick, both of whom hail from Ireland, taught us how leaders could use action research to transform their own organizations.⁶ Concurrent with our own efforts at Berkeley, the Carnegie Foundation for the Advancement of Teaching began to develop a major initiative around design-based thinking and continuous quality improvement with the idea of networked improvement communities.⁷ This initiative validated and further developed our belief that transformative leaders would benefit from design-based thinking, with potentially far-reaching consequences for larger-scale educational reform and improvement. Finally, we drew inspiration from the work by Elizabeth City and Richard Elmore and their team on instructional rounds, an example of an intervention designed to generate actionable knowledge about instruction in schools and districts.⁸

A DIALOGUE BETWEEN PRACTICE AND RESEARCH

Over the years, one central idea has been recurring in the LEEP design development team—the worlds of research and practice often do not hear each other and do not speak to each other. Universities—ours being no exception—have a way of expecting professionals to live up to the university’s presumed superior rigor of knowledge, and practitioners return the favor by questioning the relevance of research for practice. There are many good methodology texts that privilege the voice of the university. Most often, such texts center on abstract exposition of theory and use concrete examples from the practical world to illustrate their points. This book reverses this order. It communicates its message through a concrete narrative with acting researcher-practitioners at the center. Theoretical explications supplement the concrete narrative.

The book is divided into two registers, or styles of writing. In the *concrete narrative*, we describe and observe practitioner-researchers at work. Here, we introduce Christine, Michelle, Eric, and Nora as examples of leaders' problem-solving and design-based thinking. The four characters are composites that exemplify the thinking that goes into design development. The composites represent actual design development studies conducted within LEEP. Many of these studies can be grouped into several types: teacher collaboration and school climate, teacher development and authentic instruction, district and school instructional leadership, and reshaping organizational values and culture. There are some studies, however, that fall outside these types, for example, several studies on using technology or developing tools. In this book, we have concentrated on the main design development studies that focused on core challenges of equity. To facilitate understanding, we present the composite characters' thinking sequentially in the book, and we have filtered out some of the detours, trials, and moves between steps that designers may encounter in real life as they make progress. In the *excursions into theory*, we introduce the theoretical knowledge base and familiarize the readers with relevant academic concepts and discourses. We hope that the concrete narratives and the excursions into theory will, together, provide busy educational leaders with clarity about the power of design-based thinking and design development studies.

There are three ways to read this book. Those who want a graphic idea of design development should read the concrete narrative and skip the theoretical excursions in the first round. Readers who are more theoretically inclined could jump from one theoretical excursion to another and skip the concrete narrative. The theoretical excursions, by themselves, build up the necessary theoretical knowledge base for design development and school improvement. Readers who want to deepen their theoretical understanding can follow up with the basal texts that are cited in the excursions. A third way is to read the whole text in sequence and benefit from the back and forth between practical and academic ways of grasping what design development is all about. Both concrete narrative and theoretical excursions trace the design process as one that begins with the sensing and

framing of a problem of practice. The process then moves through the formulation of a theory of action, which consists of a deeper understanding of the problem and the change process. The implementation of interventions is accompanied by research activities that aim to provide data from which design principles may be distilled. These principles are then revisited, altered, or refined in subsequent iterations.

Meet the four leaders whose narratives will give us a concrete idea of what design development is all about. All four of them work in public school districts that serve large numbers of economically disadvantaged students, students of color, and immigrants. But the leaders could just as well be placed in private religious or charter school settings. And the principles of design development addressed in the book apply to more middle-class environments as well.

Two of these leaders, Christine and Michelle, are seasoned principals who have been recognized for the strength of their leadership and have been drafted into helping to craft district-wide initiatives. Christine is an experienced middle school principal known for her no-nonsense demeanor. Her background is math, training that may contribute to her methodical ways of problem solving and her organizing skills.

Michelle, an experienced elementary school principal with a penchant for art and literature, has won many accolades and awards over the years for her work. She is known in the district for her compelling charisma, thoughtfulness, and indefatigable activism on making elementary school an authentic experience for children and their families. She is outspoken about issues of racial equality and immigrant rights.

Eric is an assistant superintendent who is passionate about developing a strong instructional program. After having served as a teacher and then a middle school principal for a few years, he wants to make decisions on instruction at the systems level. This desire pushed him to move into district-level leadership while relatively young.

Nora is a young and newer principal who has focused keenly on her high school leadership. A capable administrator, she believes in the power of procedure, but also wants to be a transformative leader who takes risks for her ideals. In her first years, she has focused steadily on, and has been largely successful with, bringing about a strong commitment to social justice among the staff.

Each of these leaders has different reasons for eventually choosing design development as the mode of innovation even if he or she did not begin with this intention. Christine faces the unique challenge of having to improve on behavioral management in middle schools that are mainly staffed by novice teachers. She is convinced that this staffing pattern will persist in the future. At some point, she concludes that there is nothing powerful enough out there to solve her district's unique problem. She also hopes that her efforts can contribute to problem solving beyond her district, and she imagines herself traveling to these districts and helping them with her new design knowledge.

The idea of design development does not come to Michelle right away. She originally thinks of her advocacy for culturally relevant pedagogy in more conventional ways. When she analyzes her teachers' resistance to her efforts, she discovers that she must find ways to combine curricular and organizational changes to actually make her preferred pedagogy work in her district's schools. She arrives at design development as her answer.

Eric, self-assured and convinced that he knows what to do, stumbles into design development when his first spontaneous attempts at improving instructional supervision do not seem to give him the results he expected. Nora, from the beginning, is excited about design development. She knows that there is so little systematic professional knowledge out there on how to reduce racial and homophobic slurs in high schools that her project must make a difference in creating new practical knowledge that can be applied beyond her school.

EXCURSION INTO THEORY

Design Development and the Science of Continuous Organizational Improvement

Many of us associate the term *design* with the shape of objects, for example, designer clothes, designer furniture, industrial design, or the design of your smartphone. Innovators of design-based thinking like Tim Brown and Tom and David Kelley argue that, in

our work and our organizations, we all are, or can be, designers.⁹ Designers not only design objects, but can also design forms of human interaction that may elicit as much satisfaction among users as a well-designed object produces. And designers marshal the same creativity, whether the results of their efforts are human interactions or physical objects. Design-based thinking deemphasizes the idea of pressuring or otherwise breaking resistance by potential users of a design. It believes in the power of satisfying human needs.¹⁰ Equity-sensitive designers assume that in human interaction and learning, all participants are motivated to express their needs for competence, autonomy, and community. Designers understand that people's resistance to learning is due to fear, defensiveness, and silence—problems generated by environments that inhibit the expression of basic motivations.¹¹ Thus, designers are *user-centered*.

Designing interventions for complex problems of practice calls for both intuition and rational deliberation. For some authors, design-based thinking is seen as a “third way” between rationality and intuition.¹² For Donald Schön, reflective practitioners take perceived human needs as their point of departure for inquiry and consider these needs to envision what they want to accomplish.¹³ Design decisions around a focal task are made in a mode of deliberate trial and error. In this mode, actors constantly interact with a task-specific environment and judge the quality of their decisions according to a sense of appreciation. That is, a decision intuitively feels right if it aligns with the actors' envisioned end state and their analytical knowledge of how their field works. In designing, *both rationality and intuition are at play*.

Roger Martin suggests that rationality and intuition can be reconciled through a balance of “analytical mastery and intuitive originality in a dynamic interplay” that he calls “design thinking.”¹⁴ Similarly, Kelley and Kelley describe design thinking as “the natural—and coachable—human ability to be intuitive, to recognize patterns, and to construct ideas that are emotionally meaningful as well as functional.”¹⁵ Design thinking has been characterized in a variety of ways. Martin describes the process as a knowledge funnel, starting with the exploration of a mystery, moving toward the selection of a heuristic, or rule of thumb, and culminating in the development of a more fixed formula or algorithm that evolves from careful study of the heuristic.¹⁶ Brown explains design thinking as an iterative “system of overlapping spaces rather than a sequence of orderly steps.”¹⁷ The spaces include inspiration, ideation, and implementation, all of which are constrained by the three criteria of desirability, feasibility, and viability. Kelley and Kelley describe these overlapping spaces of design thinking as a methodology that can be used to

meet human needs through a combination of creative thinking and systematic testing of prototypes.¹⁸

Whether design thinking is an iterative cycle, a funnel, or a methodology, at the core of each model is the assumption that designers do not choose between rationality or intuition, but use both, one intertwined with the other. In Brown's iterative cycle, inspiration necessitates insight and intuition to generate new ideas. It relies on data generated from careful observation of human needs. Development of an inspiration into an ideation requires not only creative thinking, but also analysis and synthesis to search for patterns in the data collected throughout the process. In Martin's knowledge funnel, the exploration of mystery involves "hunches" or "pre-linguistic intuitions," which evolve later into rational algorithms intended to produce systematic and predictable results.¹⁹

As creators, designers try out novel or ingenious ideas for problems related to human interactions.²⁰ As researchers, they connect the dots between an unfulfilled human need, an intervention that is constructed with a testable logic, and metrics that indicate to what degree the implemented design helped participants express or fulfill identified needs. Designers embrace the uncertainty of creation, yet they are grounded in the established professional knowledge base related to the problem they have chosen to tackle. Designers are *theory and research based as well as imaginative and creative*.

A design-based approach is appropriate in a work environment that increasingly demands that leaders provide evidence for their decisions and for the results. These results need to be confirmable by participants and verifiable by a community of equity-relevant reformers. Thus, *designs aim at effectiveness*.

In education, designs for improvement should be co-design projects in which interventions are not done *to* people, but done *with* people. Leaders who engage in design-based thinking must themselves be open to learning, experiment, and critique. They need to base their interventions on testable assumptions and evidence that can be disputed by participants. Giving voice to the users of designs, not just to the designers themselves, is a matter of fairness and justice.²¹ Thus, *designs are co-created*.

In sum, design development is imaginative, theory and research based, user-centered, context-specific, created cooperatively, emergent, iterative, and dependent on results.

At the heart of design development is a notion of continuous quality improvement through iterative, evidence-based cycles of inquiry. Several models have been

developed around this main idea, design development being one of them. Total quality management, often attributed to the work of W. Edwards Deming, is another such model. It was pioneered by Japanese manufacturing industries in the postwar era.²² Following in the Deming tradition, ideas of “improvement science” have spread in recent years from manufacturing to service industries, such as health care and education.²³

Mindful of the complexity and local specificity of change, the improvement-science approach melds pragmatism and science. At the heart of the approach is disciplined inquiry that builds on existing research, practical design knowledge, and simply good ideas from change efforts across organizations. Ideas are tested in short, rapid cycles of trial and error, resulting in design prototyping. Each cycle begins with a diagnosis of a specific problem, explicit goals, and a plan of improvement steps that are subsequently implemented. The effectiveness of these steps is tested in small populations, and implementation, evidence of progress, and results are assessed. Deming’s “plan-do-check-act” cycle, later referred to as the PDSA or “plan-do-study-act” cycle, embodies these steps.²⁴ The participants are cross-role teams, ideally representing all relevant actors from various layers of the hierarchy related to the problem at hand. The purpose of the inquiry is explicitly *not* to push the participants to expend more effort or to exhort “bad apples” to increase the output of existing systems, but to learn how to change systems so that routine processes lead to better results.²⁵

Scientific principles are evident in the systematic data collection that guides and accompanies the learning process. Teams demonstrate improvement over time by quantifying their targets and developing metrics to chart progress and assess results. Evidence may be based on multiple quantitative and qualitative sources.²⁶ On a larger scale and depending on the data richness of the specific industry, statistical procedures capture quality, for example, by calculating error and variation of production output. One such approach is called Six Sigma.²⁷ On the pragmatic side, continuous improvement builds up inventories of increasingly standardized change concepts or strategies that can apply to many situations.²⁸ On the scientific side, more rigorous design development studies build up knowledge of transferable design principles and promising learning activities.

Thus, quality improvement informed by principles of improvement science incorporates knowledge from both practice and research to examine improvement activities in local contexts.²⁹ The research may produce findings that can be disseminated

and applied to other settings by distilling standard practices attached to clearly defined problems.³⁰

In *Learning to Improve: How America's Schools Can Get Better at Getting Better*, Anthony Bryk and his coauthors describe how improvement science can be applied in education organizations.³¹ The authors outline six distinct principles for this work. The approach to design development studies we have developed in this book lives and breathes these six principles.

First, those engaging in an improvement-science approach to organizational change should “make the work problem-specific and user-centered.” Here, Bryk and coauthors emphasize the need to diagnose and frame the problem by actively learning what and how strategies work. The problem solvers should focus on what needs to be solved and for whom. Emphasis is placed on the users, and the problem should be framed from their point of view.

Second, improvement science projects should “focus on variation in performance.” Problem solvers should understand and appreciate the differences of performance and should develop solutions considering the context—“what works, for whom, and under what conditions.”

Third, to do improvement science, problem solvers must “see the system that produces the current outcomes.” They should fully understand how an organization currently functions; they need to recognize its hidden complexities and use this information to develop a theory of practical improvement.

The fourth principle is the need for data. As Bryk's group explains, “we cannot improve at scale what we cannot measure.” Data should be collected continuously, and feedback should inform improvement by tracking the practices that take place. But in education, there are often multiple practices influencing the outcome. Thus, data should show “causal cascades,” or how each practice influences another practice that in turn affects something else. Data should reflect the specific processes or markers that are influencing change, along with whether they are achieving the intended outcomes.

Fifth, disciplined inquiry drives improvement. Using a sequence of inquiries or small experiments, interventions should be tested and the results from each test should inform subsequent tests. Once an intervention is tested and used in one place, designers can then scale it to other contexts by engaging in new cycles of improvement, a process the authors call “adaptive integration.”

The sixth principle is the need to “accelerate learning through networked communities.” This principle speaks to the need for an organized scientific community of partners to spread and scale robust practical knowledge.³²

As outlined in this book, design development is one version of continuous quality improvement. Design development builds up practical design knowledge for educational leaders in problem areas for which the field demands rigorous and imaginative innovation.

When leaders switch from buying and implementing programs or packages as their mode of innovation to a design mode, they begin by asking some basic questions:

- What exactly is the behavior I am trying to change?
- What causes the behavior; what forces, factors, or circumstances keep it in place?
- What must people learn or unlearn to curtail the power of these circumstances and to change the problem behavior?
- How do I generate the desire or motivation for people to learn in my organization?
- How do I generate the required new knowledge and skills, given what is available in my organization?
- What kinds of activities, tools, or structures elicit or foster that kind of learning?
- What assets can I draw from for the change process; what constraints do I need to reckon with?
- How do I open up new opportunities or spaces to act?
- What can I learn from the existing professional knowledge base on my problem?
- What can I learn from the conventional “solutions,” if they exist?
- Where is my creativity and ingenuity needed?
- Where do I enter uncharted territory?
- How will I know that what I am trying out has worked?

As the four educational leaders in this book—Christine, Michelle, Eric, and Nora—systematically go through the design development process, they will answer these questions. Throughout the book, we show how they arrive at their answers.

OVERVIEW OF THE BOOK

The book follows the basic steps in design development. The four leaders' narratives will illuminate these steps with concrete detail. All designing begins with the *selection of a problem of practice*. Not all problems lend themselves to design development. Most important, not all problems educators face are problems of practice. More about this in chapter 1.

Once a problem of practice is selected, it needs *framing and defining*. Because the field of education is so complex, most problems of practice encountered by educational leaders are ill-structured. How to handle ill-structured problems and keep problem solving manageable is the topic of chapter 2.

Educational leaders are busy people. When they think about problems, they rely primarily on their best intuition. They use intuition to make causal connections between the way they see the problem and possible remedies. That is, they have intuitive theories of action in mind. Most often, intuitive theories are implicit. Leaders act on them without being clearly conscious of why they, the leaders, did what they did. Intuition is also a powerful source of creativity, an indispensable asset for promoting change in highly complex organizations. Educational leaders develop designs by *making intuitive theories of action explicit*, the subject of chapter 3.

As powerful as intuition may be, it can also be misleading in its fuzziness. There are two ways to challenge intuitive theories of action and make them more analytical: needs assessments and consultation of the research and professional knowledge base. *Needs assessments*, discussed in chapter 4, help educational leaders confront their assumptions with data drawn from the workplace. *Consulting the professional knowledge base* and translating this knowledge into designs (chapter 5) requires educational leaders to develop and refine intellectual leadership.

Partnerships with institutions that generate or disseminate new knowledge, such as universities, play a special role in advancing intellectual leadership. The *role of intellectual leadership* is discussed in chapter 6.

After conducting needs assessments and a thorough review of the professional knowledge base, designers are ready to develop a theory of action for their intervention. This task divides into two steps. First, designers develop a deeper *understanding of the problem* (chapter 7) by looking at their focal problem's symptoms and its causes. Second, designers need to know how to lessen the power of these causal factors; to motivate people to engage in change; and to rearrange existing beliefs, attitudes, or practices or to foster new ones. Thus, they need a better *understanding of the change process* (chapter 8).

After having gained a deeper understanding of the problem's symptoms and causes and the change process, designers may still face areas of uncertainty. But even if there is little uncertainty, the sheer complexity of intervening in the organizational life of schools often requires a good dose of creativity and risk taking. We show in chapter 9 how designers move from the theory of action to *designing interventions*.

By treating an intervention as a research project—recording the project's design, implementation, and results with data—leaders will know with relative certainty whether the intervention actually worked and why it worked or did not. Thus, in *making design development research-based*, designers not only plan and implement an intervention, but also generate valuable data for future interventions (chapter 10).

In essence, the data collection stream consists of two types of data, *impact data and process data*. The difference between baseline and outcome is captured by impact data. The process that presumably has led to the outcome is captured by process data. How to avert getting bogged down by the data from typically complex equity-relevant projects and how to manage both impact and process data are the topics of chapter 11.

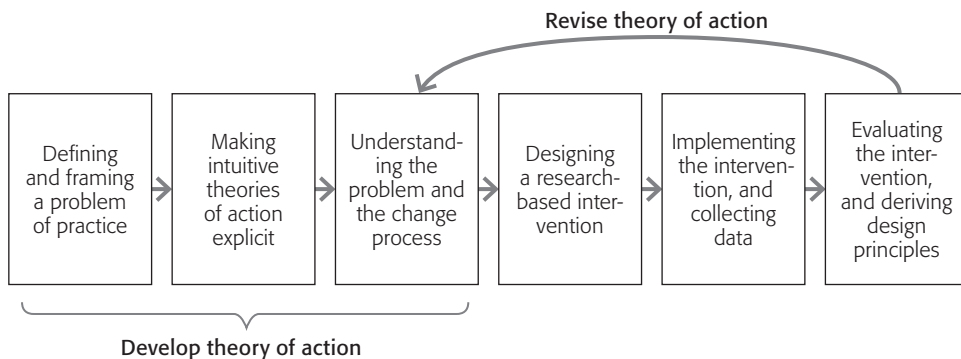
Rigor is a cornerstone in all research endeavors. We show in chapter 12 how designers *make design development studies rigorous*. The rigor of a design development study may be jeopardized when educational leaders wear multiple hats. Action research is a method that has been developed expressly to facilitate research

rigor when researchers are directly involved as actors in the processes they are studying. Chapter 13 shows how to *embed action research into design development*.

Once designers have planned their interventions and associated data collection procedures and instruments, they are ready to implement. We examine issues of *implementing interventions* in chapter 14. Finally, how designers distill from their design iterations specific lessons that can transfer to new iterations or other situations by *deriving design principles* is the subject of chapter 15. Figure I.1 summarizes all the basic steps in design development.

In moving through the fifteen chapters, the reader engages in a sequence of problem-solving steps, roughly following what John Bransford and Barry Stein coined *the IDEAL model*: identifying, defining, exploring, acting, and looking back.³³ The model is a useful organizing tool. Cycles of inquiry frequently used in education follow a similar logic. But the reality of designing is different. In Schön's conceptualization, reflective problem solving in professional practice is a conversation within a design space between designers and their tools, types, images, metaphors, artifacts, and concepts.³⁴ As designers try out solutions, these “materials” talk back to them. In education, the material is social interaction, and the “back talk” mainly originates from people.³⁵ The design space shifts as different frames are tried out. The conversation moves back and forth between attempts to understand the problem and imagined solutions or changes. Imagined solutions

FIGURE I.1 Design development logic model



influence how designers frame and define the problem, and vice versa. Innovative solutions may be the result of innovative problem framing, perception, and definition. Designs are the result of reflection and artistry, rather than rational information processing. Even though we describe the process here as sequential, in reality design thinkers skip around, and steps are repeated to enhance clarity.