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What Makes Education Research "Educational"?

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Education research is plagued by skeptics who doubt its quality and relevance. Inhabitants of schools of education have been among the sharpest critics, and internal battles rage over method and rigor. Yet often lacking is research that explains causes or examines the interplay at the heart of educational practice and policy. This article argues for a conception of research in education that deliberately presses into what is called here the *instructional dynamic*. Using a sample of studies that exemplify this quintessentially educational perspective, the authors unpack key features of research that probes inside education. They discuss how such research complements in essential ways the other kinds of scholarship that examine and inform education.

Keywords: education research; education researchers; schools of education; teaching practice

Schools of education are perennially under fire. Critics point to the uselessness of education research, the low intellectual demand of teacher education, and the weak academic qualifications of education students and their professors. Disdain for education schools is not new. From Bestor (1953) to Lyon (2002), commentators have heaped criticism on the colleges, schools, and departments whose central mission is "education" (Conant, 1963; Judge, 1982; Koerner, 1963; Levine, 2006). The very existence of these departments and schools is threatened; some leading universities have closed or downsized their schools of education. We argue that schools of education have a special role in addressing problems of educational improvement. The basis of our argument—and the answer to the question in our title—is that what makes education research "educational" is a particular orientation to scholarship that we call *research in education*.

The larger problem that animates this question is the broad challenge of educational improvement and transformation. Economic sustainability and quality of life depend on education. More—and more diverse—people need to learn more—and more varied—things than ever before. An educated citizenry is needed to tackle societal problems of health care, hunger, energy, poverty, and environmental sustainability. Moreover, as life expectancies increase and as globalization and the digital revolution alter basic notions of access and interaction, the kind of education required will change, and it will need to extend across the life span.

Yet delivering effective education remains a problem. Formal schooling and educational programs often fail. Students retain misconceptions even after instruction, basic academic skills are often undeveloped, and many youth leave school unprepared to participate competently in a democratic and diverse society. Most troubling is that education is delivered unevenly and inequitably. In the United States as elsewhere, the nature of the educational opportunities available to students living in poverty or to those who are members of underrepresented groups is on average inferior to that available to their middle-class and White counterparts. These inequities produce significant disparities in academic achievement and in employment opportunities. For individual and societal reasons, it is imperative to address these problems. To date, however, solutions have been elusive.

One impediment is that solving educational problems is not thought to demand special expertise. Despite persistent problems of quality, equity, and scale, many Americans seem to believe that work in education requires common sense more than it does the sort of disciplined knowledge and skill that enable work in other fields. Few people would think they could treat a cancer patient, design a safer automobile, or repair a bridge, for these obviously require special skill and expertise. Whether the challenge is recruiting teachers, motivating students to read, or improving the math curriculum, however, many smart people think they know what it takes. Because schooling is a common experience, familiarity masks its complexity. Powell (1980), for example, referred to education as a "fundamentally uncertain profession" about which the perception exists that ingenuity and art matter more than professional knowledge. Yet the fact that educational problems endure despite repeated efforts to solve them suggests the fallacy of this reliance on common sense. Disciplined research on problems and solutions could help in education, just as it does in other domains.

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Less clear, however, is what would characterize disciplined knowledge in education. In recent years, debates about method and evidence have swamped the discourse on education research to the exclusion of the fundamental question of what constitutes education research and what distinguishes it from other domains of scholarship. The panorama of work represented at professional education meetings or in publications is vast and not highly defined. What are the essential scope and content of education research? What are the central questions and problems that quintessentially define the domain and its subdomains?

Ironically, the low status often assigned to education creates an incentive for education faculty members to emulate work in the other social science disciplines. This has meant that research that is ostensibly "in education" frequently focuses not inside the dynamics of education but on phenomena related to education—racial identity, for example, young children's conceptions of fairness, or the history of the rise of secondary schools. These topics and others like them are important. Research that focuses on them, however, often does not probe inside the educational process. Until education researchers turn their attention to problems that exist primarily inside education and until they develop systematically a body of specialized knowledge, other scholars who study questions that bear on educational problems will propose solutions. Because such solutions typically are not based on explanatory analyses of the dynamics of education, the education problems that confront society are likely to remain unsolved. For example, knowing that the number of books in a child's home and the educational level of the child's parents are major factors in predicting school success does not explain how these factors influence learning. Nor does such knowledge help in the design of interventions for particular students.

In this article, we label an approach to research that focuses *inside* educational transactions. We call this *research in education* and distinguish it, without implying superiority, from inquiry into phenomena *related* to education. We argue that this orientation to education research is necessary for the production of the sort of disciplined knowledge that might contribute directly to solutions to pressing problems in education. In addition, we argue that phenomena outside educational settings can be studied with a special *educational perspective* complementary to the theoretical perspectives offered by other disciplines. This educational perspective offers a lens for presenting and studying particular sorts of phenomena as forms of teaching and learning.

We begin by defining education and the instructional dynamic that constitutes it. We discuss this instructional dynamic not just in relation to schools but as a metaphor for interactions that take place in many other settings. We then examine several cases of research in education and research with an educational perspective to illustrate the distinctive attention to the instructional dynamic that these studies bring to research-based problem solving. By using studies that vary in both content and method, we aim to exemplify the breadth of our argument about research that is inside education. We do not intend to displace studies that use tools from fields such as philosophy, anthropology, or psychology to inform educational questions in important ways; instead, our argument highlights work that probes the instructional dynamic inside educational situations and problems. We conclude by considering the implications of this argument for the nature and purposes of schools of education.

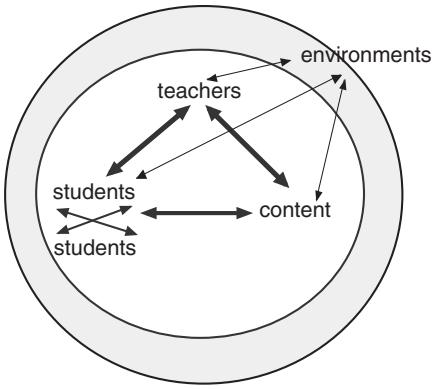


FIGURE 1. *The instructional triangle. From Cohen, Raudenbush, & Ball, 2003, p. 124. Copyright 2003 by American Educational Research Association. Adapted with permission.*

Education and the Instructional Dynamic

Education is the deliberate activity of helping learners to develop understanding and skills. Although it occurs in many settings and through a wide range of mechanisms, it is typically associated with schools, where it consists of interactions among teachers, students, and content, in the various environments of schools (see Figure 1; Cohen, Raudenbush, & Ball, 2003). By *interactions,* we mean active processes of interpretation that constitute teaching and learning. Teachers interpret and represent subject matter to students, who interpret their teachers, the content, and their classmates and then respond and act. In turn, teachers interpret their students, all of this in overlapping contexts and over time (Lampert, 2001). We consider these multiple interactions, which we call the *instructional dynamic,* to be the defining feature of education.

Other scholars have characterized the fundamental nature of education in related ways. Schwab (1978), for example, writing about the deliberate, eclectic, and multifocal activity of curriculum design, identifies four "commonplaces" of education—subject matter, learners, milieux, and teachers—which, he argues, must be coordinated in developing curriculum. This deliberate coordination constitutes for Schwab the special demand of educational work. Hawkins (1967/1974) refers to "I, Thou, and It" to emphasize that what distinguishes teacher-student relationships is their purposeful engagement in a content or subject to be learned—an external "It." And McDonald (1992) identifies a "wild triangle of relations—among teacher, students, subject" (p. 1) to highlight the uncertainty that characterizes teaching. He argues that the points of this triangle, always shifting, are what teachers must manage as they work their sensitive craft. The key idea for Schwab is the need to coordinate the four commonplaces in curriculum building; for Hawkins, it is how engagement in subject matter defines the special relationship of teachers and students; McDonald focuses on the improvisational and responsive nature of teaching. Others have used similar triangular representations, but with different elements (e.g., Bransford, 1979), to model key constituents of the educational process.

The instructional triangle that we use here (Cohen et al., 2003) is distinct from the models described above. Its focus is the

dynamic that constitutes teaching and learning as teachers and students interpret one another and their environments over time. It is a descriptive, not a normative, construct.

This instructional dynamic occurs not only in schools, where teachers help students learn academic subjects, but also in many other settings in which a teacher or leader helps others (*learners*) acquire skills and understand new ideas. In businesses, for example, executives must help employees learn new processes. To do so, they explain the processes, give examples, and guide the learners. This clearly is instruction and is not simple. New equipment or tools have no value to a business unless employees can be taught to use them effectively. Advertising also entails instructional thinking; successful marketing takes into account what customers know and care about, seeks to attract their attention, and "teaches" them what is special about the product.

A similar instructional dynamic is also evident in the implementation of many forms of social policies and programs. Health care workers who effectively institute a public health program in a rural area, for example, teach patients to employ sanitation techniques or to engage in other preventive health measures. These workers attend to how the new techniques relate to patients' current practices and beliefs, and they monitor compliance. When patients do not understand the new practices or are skeptical of their effectiveness, effective health care workers try to find ways to help patients learn more and appreciate the validity of the treatment. Educational reformers seeking to implement a new curriculum in a school face the similar task of making sure that the teachers who will use the new materials understand the program's goals and know how to make choices about when and how to use the materials provided.

We refer to the instructional dynamic, then, not only to represent instruction as it occurs in schools but as a metaphor for the interactions that constitute work in many other settings. Even if these interactions are not labeled as instructional or thus understood, there is a teacher involved. The teacher shapes the interactions of the learners with new ideas or materials. Effective teachers, whether they are classroom instructors, health care workers, business executives, policy makers, or other leaders, use their knowledge of their learners to help them develop new ideas and skills. They represent and provide examples of new ideas in multiple forms, highlight important features, and demonstrate connections between new content and what learners already know. They design specific activities whereby learners can engage with the content, including opportunities to encounter and build new ideas and skills and to analyze, question, apply, and practice that new learning. As learners work, teachers provide feedback and encouragement and strategically re-present content when necessary. They also offer incentives for learners to participate in these activities, and they regulate the environment so that it is conducive to learning.

The transactions that are part of this instructional dynamic occur not only when regular teachers and learners meet in person but also asynchronously as designers create policies, curricula, and other educational materials for use by others who must learn from them. People function as teachers or learners in many situations that we do not usually associate with those roles. The content of their interactions constitutes the material that is being taught and learned. These transactions occur whether or not anyone explicitly identifies the interactions as teaching and learning or designs for them as such. For example, whether or not textbook authors and curriculum designers craft materials in ways that anticipate learners' likely dispositions and prior ideas, users' interpretations of the material and their environments nonetheless shape their reading and use of them. The same can be said of policy. Enactors react to policies on the basis of their interpretations of them and of the environments of their work, whether or not policy makers design for their learning. Curriculum designers or policy makers can try to improve implementation by aligning their designs to anticipate and respond to enactors' knowledge, beliefs, and interpretations. Our argument is not that curriculum designers or policy makers or others are necessarily successful at teaching enactors or users, or even that they conceive their work in such ways, but that these situations can be usefully examined from an instructional perspective.

The instructional dynamic that we describe, whether it occurs in schools or elsewhere, is a specific and complex phenomenon that warrants specially focused investigation. It is this special focus that we argue constitutes the unique province of education research. It is, however, one that education researchers do not, in the main, seek to highlight and claim. Instead, education research frequently focuses not on the interactions among teachers, learners, and content—or among elements that can be viewed as such—but on a particular corner of this dynamic triangle. Researchers investigate teachers' perceptions of their job or their workplace, for example, or the culture in a particular school or classroom. Many excellent studies focus on students and their attitudes toward school or their beliefs about a particular subject area. Scholars analyze the relationships between school funding and student outcomes, investigate who enrolls in private schools, or conduct international comparisons of secondary school graduation requirements. Such studies can produce insights and information about factors that influence and contribute to education and its improvement, but they do not, on their own, produce knowledge about the dynamic transactions central to the process we call education. Knowing about and understanding teachers, learners, content, or environments—or even knowing and understanding all of these entities—is not a substitute for knowing about and understanding the dynamic relationships among them that constitute the core of the educational process. Research that focuses on this dynamic is research that probes not only the corners of the instructional triangle depicted in Figure 1 but also the arrows. These arrows represent the dynamic process of interpretation and mutual adjustment that shapes student learning, instructional practice, or policy implementation.

Consider a frequently cited study of class size in Tennessee elementary schools. Finn and Achilles (1990) investigated whether smaller classes positively affected student achievement in comparison with larger classes. The authors investigated the question by comparing students' performance on standardized and curriculum-based tests in reading and mathematics. They found that students in the smaller classes outperformed their peers in larger classes in both subjects and that minority students particularly benefited from being in smaller classes. The results suggest that reducing class size affected the instructional dynamic in ways that were productive of improved student learning. The study did not, however, explain how this worked. Improvement might have occurred because teachers were able to pay more attention to

individual students. Would the same have been true if the teachers had not known the material adequately? Would reduced class size work better for students at some ages than at others, or better in some subjects than in others? Creating effective policies for class size requires insight into how smaller classes work to affect students' achievement.

Questions about why class size matters to student learning are squarely instructional. They concern what happens inside classrooms when teachers help a smaller number of students negotiate new content. Researchers might consider, for example, the types of instructional activities that teachers are able to plan for and enact when working with only a relatively small number of students or the extent to which smaller class size allows for more productive interactions among students. These fundamentally instructional questions are enabled by Finn and Achilles' (1990) work but require the sort of educational lens that is absent from this initial investigation of the effect of class size on achievement. Knowing that class size matters is valuable for educators and policy makers, and Finn and Achilles' conclusions constitute a significant contribution to our knowledge about schools. Questions about why or how class size matters, however, are just as important. Too often, they are ignored.

Studies in the area of education often take their perspective from a discipline outside education—one that is sociological, for example, or anthropological or psychological. Such work can and often does contribute helpful knowledge about problems in education, but it is not sufficient for unpacking, understanding, and solving those problems. Education is inherently transactional; an orientation to probing the processes inside instances of education is what makes education research special. The instructional perspective also can serve as a useful lens for interactions in fields not typically associated with instruction. We argue that the unique contribution that education research can make is attention to the instructional dynamic. In the next section we elaborate on our conceptions of research in education and research with an educational perspective, and we employ several cases to illustrate the distinctive features of each.

Research in Education

Research in education investigates questions about the instructional dynamic at play in problems directly related to schooling and the formal educational process. It treats instruction, at various grain sizes, as the key variable in educational problems. To clarify what distinguishes research in education from research on a particular corner of the instructional triangle, we offer six cases of studies that meet our definition. The first three investigate problems of classroom instruction, the fourth is a study of educational program implementation across classrooms, and the final two consider problems in teacher education.

Case 1: Measuring Reading Instruction and Its Effects

Our first case is from a series of studies of reading instruction conducted in the early 1980s. Noting that much of the literature on children's reading achievement at the time relied on inadequate sampling of classroom events and insufficient models of relationships among classroom events and learning outcomes, Leinhardt, Zigmond, and Cooley (1981) launched a study of reading achievement in self-contained classrooms for learning disabled (LD) elementary school students in which instruction was the central focus. They hypothesized that the extent of students' learning in reading would be a function of what students did in class and that features of the curriculum and of teachers' behaviors in relation to that curriculum would influence students' activities in class. Three primary research questions guided their study: What is the nature of reading activities in LD classes? What types of student activities lead to the greatest improvement in reading test performance? What types of instructional situations generate these student activities?

To answer these questions, Leinhardt and her colleagues (1981) used a pretest, a posttest, and observational measures of 14 variables related to student and teacher behavior. The data collected included information about students' activities and teachers' moves, timing, and pacing. Using multiple regression analysis, the researchers found that (a) teacher behaviors influence student behaviors in class, and student behaviors in turn influence learning; and (b) most of the variance in students' posttest performance is due to teacher and student behavior. In particular, Leinhardt et al. found that increases in students' silent reading time and in the amount of direct, supervised instruction led to improvement in students' reading achievement.

This study of the factors that lead to reading achievement provides a strong example of research in education because of its focus inside instruction. Rather than simply looking for correlations between students' background characteristics and their achievement or looking at the relationship between enrollment in an LD classroom and learning, Leinhardt et al. attended to how instructional activities mediate students' learning. Their study was, in fact, noteworthy not only for its substantive contributions but for the precision of its observational measures and for the strategies that it offered for sampling the instructional domain. It demonstrated both special appreciation of factors pivotal to student achievement and expert skill in measuring those factors and using the results to inform classroom practice. A study of reading achievement that lacked this instructional focus would miss the single most important set of factors in explaining children's learning in reading.

What distinguishes the approach taken by Leinhardt et al. is its explicit focus on how teachers and students interpret one another and instructional activities in classroom contexts and how these together constitute teaching and learning. Other studies in reading focus instead on students' difficulties, on the challenges of particular texts, or on the developmental trajectories of struggling readers. Each of these offers valuable insights for tackling problems of reading achievement; by themselves, however, they do not test interventions or explain how interventions might work to improve students' reading skills.

Case 2: Studies of Conceptual Change in Science

Our second case is from a program of work conducted in the 1980s that focused on children's scientific misconceptions and how curriculum and instruction could be designed to address them. This program of research examined instruction at a grain size still finer than in the studies of Leinhardt and her colleagues (1981).

In an initial case study, Smith and Anderson (1984) examined a teacher's unsuccessful attempt to use a set of published curriculum materials to help her fifth-grade students understand photosynthesis. Following suggestions in the teacher's guide, the

teacher engaged students in an experiment in which they planted grass in both light and dark environments. The experiment was designed to illustrate the fact that plants use light to make food (photosynthesis) and that plants deprived of light will die. Despite the successful enactment of the experiment (grass planted in the light thrived; grass planted in the dark began to die), students maintained their initial belief that plants get food by ingesting materials from the soil and concluded that light simply makes plants "healthier."

In investigating why the students failed to replace their original misconceptions with an accurate understanding of photosynthesis, Smith and Anderson focused on several sets of key interactions at play in this distinctively instructional problem: They considered the teacher's interpretation and use of the teacher's guide and the way that her presentation and orchestration of the instructional activities suggested in the guide interacted with students' prior beliefs about how plants get food. Although Smith and Anderson paid close attention to individual elements of the instructional triangle—in particular to children's prior beliefs about how plants obtain food, to the teacher's knowledge of photosynthesis and beliefs about learning, and to the characteristics of the curriculum materials—their central concern was not with these individual elements but with how all of them interacted during instruction.

After multiple classroom observations and interviews with the students and the teacher, Smith and Anderson concluded that the students failed to develop an understanding of photosynthesis because their teacher neither addressed their initial misconceptions with sufficient directness nor used the curriculum materials and activities to help them relate new observations to old ideas. The teacher neglected the suggestion in the teacher's guide that she define photosynthesis, for example, and she seldom directly challenged students' incorrect interpretations of the results of their experiment. Smith and Anderson noted that the teacher believed that students' empirical observations of the dying grass plants would lead the students to derive logically the ideas that she wanted them to learn. This belief seemed to have led her to pay little attention to students' original ideas and to misinterpret or ignore several crucial suggestions in the teacher's guide for framing the experiment and guiding students' thinking about it.

In an experiment that built on Smith and Anderson's conclusions, Anderson and Roth (1989) designed an intervention meant to investigate whether a different set of curriculum materials might help students learn more about photosynthesis. Nineteen students with misconceptions about how plants obtain food were randomly divided into three groups and assigned to read about photosynthesis in either an experimental text or a typical text. The experimental text included features designed to help students shift from their initial misconceptions to an accurate understanding of photosynthesis. It continually reminded students of the definition of photosynthesis, for example, and prompted them to explain clearly how plants and animals get their food. Anderson and Roth administered pretests and posttests of students' understanding of photosynthesis and used clinical interviews to probe students' recall of the text, their reading strategies, and their explanations of how plants get their food.

On the basis of the results of the interviews and posttests, the researchers concluded that the students who worked from the experimental text and employed reading strategies aimed at conceptual change developed more accurate conceptions of photosynthesis than those who did not. The researchers argued that effective instructional materials directly address both teachers' assumptions about students and how they learn and students' beliefs about the topic at hand. The researchers also suggested that teachers should present students with situations and tasks that confront them with evidence that competes with their initial misconceptions.

These studies of conceptual change in science meet our criteria for research in education because the research questions focus on the interactions among teachers, students, and curriculum materials that take place during instruction. Smith and Anderson (1984) and Anderson and Roth (1989) understood that students' persistent misconceptions were fundamentally an instructional problem. Thus they did not merely investigate students' beliefs about how plants obtain food or teachers' epistemological views, nor did they focus on teachers' beliefs about the nature of science. Instead, they studied how those beliefs influenced how teachers and students took up and used the curriculum materials during instruction. They also explored how teachers' guides could be designed to promote effective use by teachers and how written texts could address students' likely initial beliefs and help them build a bridge from misconceptions to more accurate views. They were, in short, attentive to the dynamic nature of the educational process and to the places in which instructional interactions could break down.

Other studies in science education inform questions about the teaching and learning of science but do not probe science instruction directly. Examples include studies of 10-year-olds' abilities to produce logical explanations, of teachers' beliefs about science, and of attitudes toward science among girls and minority students. Studies such as these address important questions but do not explain the processes of teaching and learning that combine to produce instruction in the environments of school classrooms. They offer resources for better hypotheses about these interactions but do not directly examine them.

Case 3: The Cultural Modeling Project

Just as the above-mentioned researchers probed the instructional dynamic inside reading or science instruction, Lee (2007) has focused on the educational transactions at the heart of urban African American students' struggle to read and interpret literature. In an analysis of her own teaching of African American students in an urban Chicago high school, Lee hypothesized that traditional high school English instruction did not capitalize sufficiently on students' extant literacy skills. She observed that although African American youth tended to perform poorly in English classes and on measures of literacy achievement, many also routinely engaged in sophisticated language play and used effective strategies for interpreting metaphors, symbols, irony, and satire in their daily speech. Academic literary analysis, Lee noted, requires the same strategies and appreciation for the uses and nuances of language. To help students make use of this potentially powerful knowledge and skill inherent in their everyday speech, Lee developed, implemented, and studied an instructional approach that she called *cultural modeling.*

The central premise of cultural modeling is that African American English, and the oral genres that African Americans

often use, can function as a bridge to sophisticated literary analysis. Teachers who worked with Lee to implement the program invested in learning about African American English and the cultural backgrounds of their students and worked on honing their knowledge of literary analysis and English composition. During instruction, they assisted students in identifying the problem-solving strategies that they routinely employed to make sense of metaphors and other complex speech forms outside school and to connect those strategies with what they were expected to do in academic literary analysis. In teaching students to identify and interpret metaphors in canonical texts, for example, teachers sometimes began by presenting students with the lyrics to a popular song and asking them to explain how they would decode metaphors in those lyrics. Once students were able to make explicit the strategies that they employed with the familiar text, teachers helped them use the same strategies to approach the new text and to offer careful oral and written interpretations of it.

Cultural modeling as Lee has developed it helps to mediate the interactions among teachers, students, and content that constitute instruction. Individual corners of the instructional triangle play important roles in cultural modeling, but it is the transactions among the corners that matter most—the arrows of the instructional triangle. The program depends heavily on teachers' knowledge of students' cultural backgrounds, speech patterns, and out-of-school activities in addition to their expertise in literary analysis. Employed effectively, however, cultural modeling helps teachers use what they know to design instructional activities specially tailored to their students and to create a classroom climate that supports ambitious academic instruction.

In developing this alternative curriculum and studying its implementation and effectiveness, Lee does not limit her attention to teachers or students or even to curriculum content. Her study is not primarily about the African American students in the Chicago school where the investigation took place. It is also not primarily about the teachers who worked with those students, although it is attentive to the prior beliefs about African American adolescents and about teaching English that those teachers brought to the work. Lee's study is not, in short, a work of sociology or anthropology, although it draws on knowledge and on ways of knowing from those fields. Lee peered inside the instructional dynamic to understand the interactions among teachers, students, and content that happen during the teaching and learning of literary analysis. She considered how teachers draw on their knowledge of students and of academic content to design and use curriculum materials and instructional strategies and how students take up new ideas as they participate in instruction in the context of what they already know and in the midst of the particular environment of school.

Lee's focus on the instructional dynamic distinguishes her analysis of cultural modeling from other studies that investigate the problem of low academic achievement among African American students by asking questions merely about students or teachers. Much of the research that pertains to the education of underachieving students is inattentive to the instructional dynamic. Examples of such work include studies of African American youth culture, of segregation among peer groups in middle schools, or of language use in rural Appalachian communities. They also include investigations of the effects of high school exit exams on dropout rates and studies of teachers' beliefs about low-income and minority students. These are important inquiries that inform our understanding of underachieving students, but they are not about educational transactions.

Case 4: The Implementation of K–12 Mathematics Reform in California

Identifying effective instructional regimes and school reform programs and the factors that lead to their success is a key problem in education and one in which the instructional dynamic is centrally relevant. How teachers use curriculum materials and what they do with students matters for what students learn. Thus an effective evaluation of a particular program implemented across multiple sites necessarily takes into account differences in the way the program is used at the classroom level. One implication of this is that educational innovations are likely to meet with more success when they are informed by knowledge about effective instructional practices and when the teachers who implement them have opportunities to learn to engage in those practices in the context of the innovation. One way to frame the problem of implementation, then, is as a problem of professional learning. The task for the designers of programs and policies is to teach implementers to use the new ideas effectively.

Cohen and Hill's (2001) investigation of California's attempt during the 1990s to improve mathematics instruction in its elementary schools illustrates this focus on the instructional dynamic that is at the core of effective program implementation. The goal of the California math reform was to engage all students in more intellectually demanding work on mathematics. The reform included unusually detailed guidance for teaching and learning, including curriculum frameworks, instructional materials, assessments, and professional education for teachers. Thousands of workshops were offered around the state to allow teachers to learn about these new materials, to study students' work on the new state assessments, and to collaborate in solving the problems of delivering the new curriculum.

In their study, Cohen and Hill conceived of the implementation problem in California as one of professional learning. Their analysis focused on the instructional dynamic at play in reformers' explanation of the new program to teachers and in teachers' attempts to use the new curriculum. They considered, for example, how teachers' beliefs about mathematics teaching and learning influenced their willingness to adopt the suggested instructional strategies and materials. They also examined the extent to which teachers' opportunities to participate in relevant professional education was related to their reports of using instructional practices aligned with the reform.

Cohen and Hill concluded that although many teachers were enthusiastic about the ideas associated with the reform, they were also deeply reluctant to change their instruction and, when they did adopt new practices, did so only in a piecemeal fashion. Others adapted reformers' ideas so that in practice they differed little from conventional forms of instruction. Cohen and Hill's central finding was that the reform succeeded in changing teachers' practice to some degree but only when teachers had significant opportunities to participate in professional development that helped them understand the reform and learn new ways to teach. Only a small fraction of California elementary teachers had

these opportunities, however, and the fragmented and incoherent reform that resulted met with limited success.

Cohen and Hill's study suggests that educational innovation might be viewed in much the same way as classroom instruction: The ideas associated with a reform do not act on their own to change practice but are subject to various kinds of use. Reformers function as instructors who represent new ideas to teachers, who are the learners in that situation. The reformers design curriculum materials that are more or less attentive to teachers' prior beliefs and practices, and they create or fail to create effective opportunities for teachers to learn and practice with the new materials. Reform implementation can thus be conceived of as an educational process. Studies of it can profitably investigate the multiple interactions that occur as reformers teach about a new program and learners learn about and adopt—or fail to adopt—the new ideas.

Cohen and Hill's analysis of the California math reform departs from conventional program evaluation in its attention to variability in implementation. Rather than rely on aggregate data about the extent to which desired practices have been adopted across sites, Cohen and Hill considered varying degrees of adaptation and reasons for the variation. The knowledge produced by an implementation study such as this one is potentially powerful for reformers. It offers explanations for why reform succeeds or fails and provides a basis for suggestions for more effective implementation.

Case 5: Preparing Mathematics Teachers

The same attention to the instructional dynamic that the abovementioned studies apply to classroom instruction and reform implementation can also support research on teacher education. Questions about how teacher education affects K–12 pupil achievement and what qualities of student teachers matter are fundamentally educational and require research designs that attend to the instructional dynamic. We illustrate this point with two additional cases, one that is small scale and qualitative and the other, quite different, that is large scale and mixed method.

In the first, Borko and colleagues (1992) closely analyzed an episode in which a student teacher was unable to provide an accurate, conceptually based justification for a division-of-fractions algorithm (the invert-and-multiply rule) in response to a pupil's question. This episode occurred in the context of the authors' longitudinal study of the student teacher's learning across courses and field experiences in her teacher education program. Surprised by the episode, which occurred late in their study, the researchers looked for an explanation in the interactions among the student teacher, her instructors in the teacher education program, and the teacher education curriculum. They were particularly attentive to how the student teacher's knowledge of mathematics and her beliefs about good teaching influenced her willingness and ability to apply the instructional strategies suggested in her teacher education program.

Drawing on their extensive interviews, observations, and a questionnaire, Borko and her colleagues analyzed the student teacher's knowledge of mathematics and beliefs about good mathematics teaching, experience with university coursework, and classroom thinking and actions. They found that her knowledge of fractions was insufficient for teaching the content effectively and that, although she held some beliefs that were compatible with professional views of good mathematics teaching, she held other ideas about her own subject-matter knowledge and about how she would learn to teach new topics that appeared to inhibit her in learning what she needed to learn to provide a conceptually based explanation for the division-of-fractions algorithm. The researchers observed in interviews with her over the course of the school year that she spoke increasingly about the role of practice and of sources such as her students' textbook in learning to teach and seemed to discount the value of her mathematics methods course at the university. Moreover, the researchers found that the methods course itself seemed to compound this difficulty.

According to the observations of Borko et al., the instructor in the methods course moved too quickly through material, assumed that student teachers in the course had already mastered the necessary mathematical knowledge, and failed to explain key conceptual shifts that he made in explaining the division-of-fractions algorithm. He appeared unaware that students' repeated requests for additional explanations of the invert-and-multiply rule might indicate confusion. The research team also found that the teacher education program as a whole may have contributed to the student teacher's difficulty. Borko et al. concluded that student teachers' reliance on independent practice and on "ideas that will work" was created by the multiple demands placed on them by the design of the program, which left them with little time for thoughtful engagement with course material or lesson planning. The researchers also found that the program had allowed the student teacher in the case study to test out of a required course on elementary mathematics concepts that might have helped her acquire mathematical knowledge fundamental for teaching. They argue, in conclusion, that teacher education must challenge student teachers' fundamental beliefs about learning, teaching, and learning to teach.

As in the other studies that we have discussed here, this analysis attends carefully to complex interactions among students, instructors, and content in trying to explain how instruction works and, in this case, where it fails. Borko et al. demonstrate an appreciation for the reality that no single element of teacher education is responsible for the student teacher's difficulty—not the student teacher's extant knowledge of mathematics or beliefs about teaching and not the content of methods courses, the skill of teacher educators, or the structure and expectations of the teacher education program. Rather, they point out how these constituents of the instructional triangle interact with each other in ways that either promote or inhibit learning. The researchers target these interactions for close study, situating their work firmly in the domain of education.

Case 6: Investigating Pathways Into Teaching in New York City Schools

A recently launched study of teacher education programs in New York City by Boyd and colleagues (2006) exhibits a similarly instructional focus. This large-scale, mixed-method analysis examines features of the multiple pathways into teaching that exist in New York City and the impact of those features on where teachers teach, how long they remain in the classroom, and student achievement in reading and math. Although Boyd and his colleagues have not concluded their work in this study, their

research questions and methods demonstrate significant attention to the instructional features of teacher training and how those features affect pupil achievement and the teacher labor market.

A central premise of this Pathways study is that labels for individual teacher education programs, such as *traditional* and *alternative,* may mask critical differences in program features and in the educational experiences that students have across programs. The researchers argue that a complex set of interactions exists among teachers' background characteristics, teachers' opportunities to learn in various programs, and features of the school contexts in which prospective teachers complete field experiences and ultimately choose to teach. They hypothesize that these interactions, which vary from one program to the next, influence both pupil outcomes and the teacher labor market. The researchers assert that such interactions need to be unearthed and closely examined if researchers and policy makers are to make well-informed decisions about whether—and how—different pathways to teaching work.

To identify and understand these interactions and move beyond blurry distinctions between types of programs, the research team used interviews with program faculty, state and program documents, faculty surveys, and syllabi from methods courses to collect data on more than a hundred teacher education programs located in 18 colleges and universities. They also examined in detail specific characteristics of pathways into teaching in five areas, including program structures; subject-specific preparation in reading and math; preparation in learning and child development; preparation to teach racially, ethnically, and linguistically diverse students; and the characteristics of field experiences. To understand students' experiences in these programs and to enable management of selection bias, the researchers surveyed the 2003 cohort of entering program participants and the 2005 cohort of first-year teachers. They supplemented this information with administrative data, including demographic characteristics, salary, education, performance on certification exams, certification status, and career paths, from New York City's comprehensive database. Finally, they collected background data and test scores for pupils in New York schools and used them to construct value-added measures of student achievement.

Boyd et al. plan to use these data to peer into the black box of teacher education and weigh a range of inputs and outputs and their interactions. In particular, they are attempting to distinguish among student teachers' own characteristics, the features of individual teacher education programs, and the characteristics of the schools in which student teachers work and to estimate the effects of each of these variables on teachers' career paths and on the educational outcomes of their students. These analyses are likely to enable the researchers to consider questions such as which aspects of particular pathways into teaching affect the selection and recruitment of excellent teaching students, which aspects act independently of students' entering characteristics to improve their ability to teach, and which are effective in preparing candidates for teaching in particular kinds of schools. Although at a much larger grain size than the study conducted by Borko et al. (1992), the Pathways study is similarly attentive to the fact that teacher education consists of a set of interactions among instructors, learners, content, and environments. In choosing to train their analytic lens directly on those interactions as they search for explanations for differences in pupil achievement and fluctuations in the teacher labor market, Boyd et al. establish their work within the domain of education research.

In each of the six studies we have described here, researchers combine foundational knowledge of education—of its history and purposes, of the problems that plague it, and of the resources that can contribute to its success—with an analytic perspective that foregrounds the multiple interactions that constitute the instructional dynamic in the situation. Their awareness of these interactions and of the points at which they can be enhanced or disrupted and their ability to choose research questions that focus the investigation on the instructional dynamic highlight a distinctive expertise.

The Special Niche of Education Research

Education is not the only research field that struggles to define its special focus and to clarify the domains that researchers in it are, or should be, uniquely equipped to study. The field of organizational behavior, for example, suffers from similar problems. Heath and Sitkin (2001) found that most published work in the field of organizational behavior emphasized the *behavior* of individuals and groups and was comparatively less attentive to the *organizational* aspects of organizational behavior. Most work in the field, they contended, addresses behavior that is common across many arenas—not particularly central to organizations or organizing—and is studied by researchers in many other social science fields. Heath and Sitkin argue that if most work ostensibly about organizational behavior is merely about interesting behavior, then the field risks failing to address questions that are truly relevant to organizations. To examine whether and how a study probes questions at the heart of organizational behavior, they deploy two tests. One appraises the degree to which a study is central to understanding organizations; the second considers, for any given investigation, whether special expertise of organizational behavior is entailed.

The *organizational centrality test* asks, How much would we understand about organizations if we understood everything there was to know about (the topic proposed for study)? According to Heath and Sitkin (2001), if the answer is "not much," then the topic is probably peripheral to the study of organizational behavior. Education researchers could perform an analogous test. Researchers considering whether to study the culture of African American peer groups in a middle school, for example, might test the *educational centrality* of the study's focus and discover that even if they learned everything there was to know about African American peer group culture, they would still know little about the education of this particular group. It is not that the proposed study would be without merit; on the contrary, it would be a topic of likely interest to psychologists, sociologists, and others interested in culture, social groups, and peer influences. The study's results might have important implications for education research. But the research itself would not probe the special phenomenon that is education.

Heath and Sitkin's (2001) *core competence test* works similarly: Researchers may ask about a given study, Is this a topic about which organizational behavior researchers have unique insights that are not likely to be shared by researchers in related social science disciplines such as psychology, sociology, political science, or economics? If the answer is no, Heath and Sitkin argue, then

perhaps the topic is not best studied by organizational behavior researchers. Scholars in education might ask themselves a similar question to help focus their work on topics that are central to education and that put their unique knowledge of and appreciation for the importance of educational transactions at the core of their investigations. If they do not do so, who will?

As we argue above, an instructional dynamic is present and of central import not just in schools but in other organizations as well. Education research can, therefore, contribute a lens useful to work in other domains; this perspective can offer leverage on complex dynamics with which many struggle. In the next section we discuss two studies, both from the field of political science, that demonstrate the application of this perspective to problems outside education.

Research That Applies an Educational Perspective to Problems Outside Education

We claimed earlier that teachers make strategic decisions about the presentation of content and that the interactions among teachers, learners, and ideas are of central import. This framework applies not only to instances of explicit teaching and learning but also to circumstances in which individuals in leadership or service-delivery positions interpret, represent, and administer programs, policies, and other content-rich materials. Researchers from across the social sciences who find themselves addressing problems with an instructional dynamic might usefully apply such a framework to their analyses. Lipsky's (1980) study of human service organizations, *Street-Level Bureaucracy,* offers a helpful illustration.

Lipsky (1980) examines how "street-level bureaucrats"—teachers, social workers, public interest lawyers, and police officers—influence the implementation of public policy. His is an educational lens, although he does not label it as such. Viewing street-level bureaucrats as mediators and interpreters of policy, Lipsky investigates the fine-grained decisions they make about how to administer policies and programs. In particular, he studies how these professionals socialize citizens to certain expectations of government services, determine eligibility for government benefits and sanctions, and oversee the treatment that citizens receive in and through government programs. Lipsky explains that "in a sense street-level bureaucrats implicitly mediate aspects of the constitutional relationship of citizens to the state" (p. 4); he argues in conclusion that these workers, rather than legislatures or high-ranking administrators, actually make policy.

Key to this study is Lipsky's attention to how midlevel bureaucrats mediate policy. Just as classroom instructors or educational reformers strategically represent content to learners, the workers in his study decided how to make resources and opportunities accessible to clients on the basis of their understanding of both program aims and client needs. Although the interactions among bureaucrats, programs, clients, and settings are not consciously instructional, Lipsky's approach to studying the dynamic can be represented by the instructional triangle.

Attention to a similar dynamic is evident in Lin's 2000 study of social policy in prisons, *Reform in the Making.* In this study, Lin examined the implementation of rehabilitation programs in prisons, including literacy programs, high-school equivalency classes, vocational training, and drug-treatment programs. She sought to uncover why some of these programs reduce recidivism and some do not. In doing so, she examined how program design and administration interact with the needs of both prisoners and prison staff and how these interactions can determine a program's success or failure. As Lin put it, program implementation consists of "the interaction of a program's rules and resources with an environment that filters, interprets, and makes use of those rules and resources in different ways" (p. 35). Lin found that the most successful programs are those in which staff members encourage prisoners' participation, communicate openly with prisoners, and show a commitment to the programs and the quality of their administration. Instructors in successful programs, like effective instructors in more traditional educational situations, tailor their teaching to individual prisoners' needs and refuse to let struggling participants drift.

Lipsky (1980) and Lin (2000) are but two examples of researchers who apply an educational perspective to problems outside education; although they are both in the field of political science, other examples exist across the social sciences. Some social problems that could usefully be illuminated from an educational perspective are instead investigated using other lenses. The onus is on education researchers to define the central contributions of their field and to promote greater awareness of how an educational perspective might prove useful to problem solving across multiple domains. We turn next to examine the essential role of schools of education in articulating the quintessential nature of research in education and in cultivating the expertise demanded for such research.

Implications for the Nature and Purposes of Schools of Education

Schools of education should acknowledge a special responsibility to produce disciplined knowledge in education. They must be places that both house and prepare researchers with special knowledge of the instructional dynamic and with the skills required to study it. At the center of every school of education must be scholars with the expertise and commitment necessary to study educational transactions, whether they occur in schools or elsewhere. These scholars must ensure that problems in education benefit from sufficient scholarly attention and that younger scholars receive the training they need to develop core competence in education research. If schools and departments of education do not make the development of knowledge in education—and thus the housing and preparation of education researchers—their primary reason for being, and if they do not work actively to disseminate that knowledge among policy makers and members of the public, then educational problem solving will be left to researchers and professionals without the requisite expertise. And the core technology of education will remain inadequately studied.

One implication of this argument is that schools of education need to embrace unapologetically the worlds of both practice and scholarship. Educational practice is the core concern of education research, and those who study it must know it well. But education researchers must also arm themselves with the special analytic skills that will allow them to usefully bridge the alleged divide between theory and practice. It is along this divide that education researchers have special expertise.

Ironically, analyses of the challenges and troubles so often faced by schools of education during the past century frequently point to this borderland as the source of the troubles. Critics explain that the perception that education is an applied field and that knowledge produced in and about it is "soft" and lacking in rigor has led schools of education to emulate the social sciences more than to define their own focus and niche. Clifford and Guthrie (1988), for example, argued that schools of education, particularly those located in research universities, have become "ensnared improvidently" in the academic and political cultures of their universities and have tried to develop an "instant science of education" that they hope will please their colleagues in disciplinary departments but that often focuses on issues peripheral to instruction and to the complexity of life in schools. In the process, Clifford and Guthrie assert, schools of education have failed to satisfy the needs and expectations of either the university or the schools where research might be used to improve classroom learning. Labaree (2004) concurred; he contended that faculty members in education are torn between commitments to the public schools and to the academy and are isolated from both, and that as a result they have continued to draw "unrelenting fire" from both sides. These analyses seem accurate. However, where some have found the position of education research at the intersection of theory and practice to be a near-fatal problem, we argue that education researchers must claim and take advantage of the borderland. It is precisely through work along this boundary that we can begin to address problems in education—and thus justify our occupation of university real estate.

The production of education research and the cultivation of education researchers are, in fact, the only purposes to which schools of education in research universities can lay exclusive claim. Others have argued that the special function of a school of education is to prepare teachers. Teacher education is indeed a fundamentally important part of the mission of the school of education, and schools and departments of education in colleges and universities can make special contributions to the training of teachers (see Ball & Forzani, 2007). A close inspection of the landscape of teacher preparation in the United States, however, makes clear that schools of education in research universities have no unique stake in teacher education. One reason is scale: Teachers make up the single largest occupational group in the United States, and schools of education lack the capacity to prepare sufficient numbers of teachers for American schools. Most students preparing to become teachers receive professional training in a comprehensive university, in a liberal arts college, or, increasingly, in a nonprofit organization such as Teach for America. Furthermore, schools of education do not "own" teacher preparation, even on their own campuses; prospective teachers complete a significant portion of their study in other academic disciplines, making teacher preparation an all-university endeavor. Schools of education are, however, uniquely able to produce disciplined knowledge in education and to maintain a robust agenda of research that might yield solutions to important problems.

To claim and define the problem space that is uniquely theirs, faculty members in schools of education must develop professional training deliberately designed to prepare the next generation of scholars to do high-quality work in the field. Such training must help beginning education researchers to (a) understand the environments and problems that are the focus of education research and the theoretical perspectives that enable productive study of those environments and problems, (b) develop questions for study that are central to education and that capitalize on the core competence of education researchers, and (c) learn to design and choose appropriate methods for education research. In this scenario, prospective researchers who choose schools of education for their professional training would do so because their primary interest is in acquiring training for studying educational problems. Those who are interested in educational questions but find themselves drawn more clearly to the disciplinary perspective of a different social science field would choose training in another unit of the university.

It is not the case, however, that only researchers who study instruction should call schools of education home. Disciplinary scholars who work from perspectives outside education can make substantial contributions to educational problem solving and to the preparation of education researchers. As we have tried to show, research in education is often enabled by studies that do not investigate educational transactions but rather contribute fundamentally important insights about elements of the instructional triangle. Many scholars whose work circles the instructional dynamic but does not probe deeply inside it nonetheless maintain a focus on problems related to education, and the field has much to gain by housing them and supporting their work. In addition, the school of education should serve as a resource to scholars in disciplinary departments across campus who choose to investigate problems related to education.

What we envision, then, is a porous and multidisciplinary school of education, one not unlike many that currently exist on American campuses. We argue, however, that research focusing on educational transactions should be the principal concern of schools of education. It seems reasonable to assume that every school of education should have a central core of researchers who are unlikely to find a home in any other unit of the university and who produce significant work that would not be expected to appear elsewhere on campus.

Three elements thus constitute the central argument of this article: (a) understanding the dynamic interactions among teachers, students, content, and environments; (b) viewing phenomena not usually considered education-related as instances of teaching and learning and applying parallel questions and approaches in studies of those phenomena; and (c) viewing the transactions that constitute education as uniquely distinguishing research in education from other useful inquiries about or related to education. We began by pointing to the proliferation of problems in education that confront not only the United States but societies around the world; we conclude with the admonition that if education researchers fail to articulate the nature and value of specialized knowledge in education, then these problems will be left to common sense or to professionals with expertise not precisely suited to the work.

Several potential pitfalls and misunderstandings attend our argument. One is that we may be misinterpreted as suggesting that research with an educational perspective is only about classroom instruction. Our use of the term *instructional* is deliberate, for with it we signal the essential frame of the interactional

dynamic represented by the instructional triangle. However, we emphasize that we use this frame not only to represent classroom instruction but also as a metaphor for the interactions at the core of phenomena other than classroom teaching. And although we contend that instruction in schools is a central problem to which education research must attend, the usefulness of the instructional perspective for studying interactions in other domains is a central part of our argument.

A second potential pitfall of our argument is that it may be interpreted as a judgment that some studies are valuable and others are not. We seek to name and highlight the importance of research inside educational processes because we argue that it is a special contribution unique to education research. We do not intend to diminish the value of learning more about individual elements of the instructional triangle, such as teachers' beliefs, school funding, or various curricula, nor do we wish to deny the key contributions that such work makes to research in education. We hope that our efforts to bring the instructional perspective to light will not lead some to conclude that we view other goals for research related to education as less worthy.

Third, our argument is not intended to specify restrictively who belongs in a school of education. Educational phenomena are usefully studied using tools and perspectives from other disciplines, and the interdisciplinary culture needed to support inquiry into education depends on intellectual diversity among the faculty. Too rare, however, are scholars steeped in the instructional perspective or whose specialization is instruction. Our argument would therefore support a closer look at the composition of education faculty to ensure that it reflects significant expertise in the field's unique area of competence.

Our argument also suggests questions for further investigation and elaboration. One centers on specialization in our field. What distinguishes educational psychology, for example, from other areas of specialization in psychology? What characterizes this specialization (see Calfee & Berliner, 1996)? What makes "educational" sociologists, anthropologists, and historians different from their disciplinary colleagues who do not study problems related to education?

A second important question is whether there is a set of core problems on which research in education especially focuses. Most other fields can be mapped by a consistent set of questions and problems, but a look at the literature in education research or at the myriad subspecializations with which education scholars affiliate ("special interest groups") suggests that we do not currently have such a set of core problems.

A third important question is how our argument about research relates to the professional education for which schools of education are responsible. Studies of professional education could constitute a key activity of faculties of education. Given this, schools might design programs of professional education not only to prepare their own students for practice but also to serve as laboratories for the study of teaching practice and teacher education.

Schools of education are rich with potential to explore and develop this special competence in education. The larger institutions that they inhabit are themselves educational institutions. As such, schools of education house the core expertise for the entire enterprise—understanding how particular programs and interventions work; studying the interplay among recruitment, support, and environments in student persistence; and examining critically whether and how outreach activities are worthwhile. We argue that schools of education have a special role in addressing central problems of educational improvement in higher education, in precollege schooling, and in contexts other than formal institutional ones. The distinctive expertise that education schools can bring to the institutional mission is an opportunity to seize and develop. Doing so will require, however, a disciplined articulation of expertise in education and the courage to define it as such. It will also require focused development and extension, for the claim to expertise is without value unless we can increasingly demonstrate what the instructional perspective offers to studies of teaching and learning as well as to other phenomena.

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