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Instructional Program Coherence: What It Is and Why It Should Guide School Improvement Policy

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We present the concept of instructional program coherence and explain why school improvement frameworks that incorporate instructional program coherence are more likely to advance student achievement than multiple, unrelated efforts. We present evidence that Chicago elementary schools with stronger instructional program coherence make higher gains in student achievement. We also share observations on how, in specific schools, principals and external partners directed key school resources toward the development of instructional program coherence. In closing, we discuss factors within the educational system that discourage instructional program coherence and suggest ways that school leaders, school improvement partners, and policymakers can support greater instructional program coherence.

In this article, we propose that reform efforts may fail to improve student achievement if they fail to strengthen instructional program coherence within schools. We define instructional program coherence as a set of interrelated programs for students and staff that are guided by a common framework for curriculum, instruction, assessment, and learning climate and that are pursued over a sustained period. Reform that strengthens instructional program coherence contrasts with efforts to improve schools through the adoption of a wide variety of programs that are often uncoordinated or limited in scope or duration. We explain why such approaches, however innovative, are less likely to advance student achievement than are more coherent programs. We test and support our argument with data from Chicago elementary schools that show greater achievement gains in schools with more coherent instructional programs. Using field study data from a set of schools, we then describe how some principals and external partners directed resources to develop greater instructional program coherence. In closing, we discuss factors within the U.S. educational system that undermine instructional program coherence. We recommend that school leaders, school assistance organizations, and policymakers give more attention to strengthening instructional program coherence.

The Problem: Too Many Unrelated, Unsustained "Improvement" Programs

Over the past decade, many poorly performing elementary schools have sought to improve their instructional programs and outcomes by adopting numerous school improvement projects, programs,

and partnerships. The following pattern often emerges: Staffs divide themselves among various initiatives and direct a great deal of time and energy into multiple workshops, meetings, and conferences. Immediate success may not be expected from these efforts, but with time, desired improvements in student achievement gains fail to materialize and professional fatigue and frustration rise. Many of these improvement programs fade or end, while new programs continue to be adopted.

These schools are caught in a bind. They want to acquire programs and materials that might help them to teach more effectively, but they soon find themselves in a large and fragmented circuit of school improvement activity. Principals may recognize that faculty members' attention is scattered, but hooking up with multiple initiatives seems to be the only way to gain needed resources and to promote the commitment of staff with different interests and strengths. Moreover, the emotional and social needs of many students require external partnerships. With so many demands, principals feel unable to refuse programs and reason that diverse programs will somehow complement one another. They continue to adopt or pilot programs but do little to establish or strengthen coordination and coherence among them.

Prior Literature and Discussion of Coherence

The idea of coherence often surfaces when educational researchers confront practices, programs, or policies found to be poorly conceived and coordinated or at odds with other practices, programs, and policies. To our knowledge, however, no studies have offered a thoughtful, systematic definition and exploration of school-level instructional program coherence. Some direct and indirect arguments in favor of greater curricular, organizational, or policy coherence in education have been raised, but they do not address three important matters. First, they do not address instructional program coherence and how it might constitute an important school improvement strategy. Second, they do not provide a theoretical explanation for why strong instructional program coherence might be expected to advance student learning. And third, they do not offer an operational definition that could support empirical study of the effects of greater coherence on student learning. After reviewing how prior literature has most often discussed coherence, we address these three concerns.

The concept of coherence has surfaced perhaps most explicitly in discussions of curriculum improvement (Cohen & Ball, 1996; Smith, Smith, & Bryk, 1998). Calls for coherent curriculum argue for sensible connections and coordination between the topics that students study in each subject within a grade and as they advance through the grades.

Instructional program coherence entrails curricular coherence, but entails several other criteria as well.

More indirect are discussions of coherence, or the lack thereof, in the school organization literature. For example, prior studies have documented the importance of organizational factors such as unity of purpose, a clear focus, and shared values for student learning (Bryk, Lee, & Holland, 1993; Coleman, Hoffer, & Kilgore, 1982; Hill & Celio, 1998; Sergiovanni, 1994). Other research has drawn attention to schools where diverse improvement initiatives have no apparent effect on core achievement goals because they lack the sustained attention of the majority of staff (Allington & Johnson, 1989; Cohen & Ball, 1996; Elmore, 1996; Newmann & Wehlage, 1995; Smylie, Bilcer, Kochanek, Sconzert, Shipps, & Swyers, 1998). Similarly, early research on school reform in Chicago focused attention on the problem of "Christmas tree" innovation, that is, improvement efforts that brought attention to a school through program and equipment purchases but that failed to build its capacity to improve teaching and learning (Bryk, Sebring, et al., 1998). Concern for greater school-level coherence is suggested in movements toward "whole-school" reform such as those advanced by the New American Schools Development Corporation (New American Schools Development Corporation, 1991). These reforms seek to replace limited or piecemeal improvement efforts with school reform models that demand simultaneous change in a set of fundamental organizational supports or "commonplaces," such as curriculum, student grouping, staff development, and school governance. This approach to school improvement is increasingly common. It is, for example, used in the Chicago Public Schools (CPS), which requires schools to organize school improvement planning around five essential supports: school leadership, parent and community

involvement, professional community, a student-centered learning climate, and high-quality instruction (Bryk, Lee, & Smith, 1990; Bryk, Sebring, et al., 1998; Chicago Public Schools, 1995; Newmann & Wehlage, 1995). Although whole-school models may spur more extensive improvement or restructuring efforts, they may or may not address relationships between supports and their collective link to student learning. Schools can develop supports in more or less coherent ways, and all of the supports could be present without strong instructional program coherence.

Finally, studies on the broader educational system tends to discuss coherence as alignment of a school's instructional program with external policies and standards (Consortium for Policy Research in Education, 2000; Furhman, 1993; Smith & O'Day, 1991). Such studies point out how cluttered and contradictory state and district policy environments can fragment school development efforts (Cohen, 1995; O'Day, Goertz, & Floden, 1995), but they do not address how administrators and teachers might develop greater within-school coherence.

A Definition of Instructional Program Coherence

The aforementioned studies and others on school improvement certainly imply the need for instructional program coherence, but they have not provided an operational definition. Based on our own studies of school innovation in diverse contexts and a review of research on learning, motivation, organizational productivity, and school effectiveness, we define instructional program coherence as a set of interrelated programs for students and staff that are guided by a common framework for curriculum, instruction, assessment, and learning climate and are pursued over a sustained period. Strong program coherence is evident when three major conditions prevail in a school:

1. *A common instructional framework guides curriculum, teaching, assessment, and learning climate. The framework combines specific expectations for student learning, with specific strategies and materials to guide teaching and assessment.* One example is the Cunningham approach to literacy, which provides a framework for curriculum, instructional strategies, and assessments and which specifies that learning activities be organized into four areas: guided reading, self-selected reading, working with words, and writing (Cunningham & Allington, 1999). Another example is Success for All's approach to mathematics, which provides grade-aligned curriculum, makes learning expectations clear (for example, students must engage in mathematical reasoning in situations outside school), and specifies instructional strategies for particular types of learning, such as manipulatives to represent concepts or symbols and cooperative learning methods for problem solving (Slavin, Madden, Dolan, & Wasik, 1996). Although instructional frameworks are often developed by external providers, schools may also develop their own. In either case, a common instructional framework would mean the following:

   a. Curriculum, instructional strategies, and assessments of students are coordinated among teachers within a grade level.

   b. Curriculum and assessments of students proceed logically from one grade level to the next and offer a progression of increasingly complex subject matter rather than repeating rudimentary material previously taught.

   c. Key student support programs, such as tutoring, remedial instruction, parent education, and opportunities for parent involvement focus consistently on the school's instructional framework.

2. *Staff working conditions support implementation of the framework.*

   a. Administrators and teachers expect one another to implement the framework.

   b. Criteria for recruiting and hiring teachers emphasize commitment to and competence in executing the framework.

   c. Teachers are evaluated and held accountable largely on the basis of how effectively they use the common instructional framework.

   d. Professional development opportunities for staff are focused on the common instructional framework, and professional development on complex topics is pursued over a sustained period. (For instance, after being introduced to a new teaching strategy, teachers have several opportunities to critically examine it, to implement it in their classrooms, and to receive feedback from colleagues and outside experts. The new strategy becomes a focus for teacher discussion and reflection for several months or even years.)

3. *The school allocates resources such as funding, materials, time, and staff assignments to advance the school's common instructional framework and to avoid diffuse, scattered improvement efforts, with the following results:*

a. Curriculum and student assessments remain stable over time.

b. Teachers' professional assignments are stable enough that teachers have sustained opportunities to learn how to teach well in their specific roles.

Our definition emphasizes focused and strategic coordination of key school supports for instruction (especially curriculum), instructional strategies, assessments, student support programs, teaching assignments, expectations for teachers' performance, and in-service professional development. In these matters it differs from whole-school reform or even fidelity to a reform program because a school could faithfully implement a comprehensive collection of programs that do nothing to build instructional coherence in the school. That is, in fact, what we have increasingly observed.

Our definition also distinguishes instructional program coherence from policy alignment with the external environment. We recognize that within-school coherence can be profoundly affected by conditions and policies beyond the school, but alignment to external policies may promote, undermine, or have no effect on the degree of instructional program coherence. For example, school alignment with the following policies might exacerbate program incoherence: (a) The state mandates curriculum standards that call for student mastery of hundreds of discrete competencies with no common themes or skills connecting them, or (b) the district recommends that all elementary teachers participate in one-day introductory workshops on portfolio assessment, classroom management, higher order thinking, guided reading, and culturally responsive teaching. In contrast, district policy could assist instructional program coherence by requiring elementary schools to offer literacy instruction based on nationally recognized models and by offering a three-year sequence of professional development for school teams to help them gain mastery in an approach. Thus any single policy could promote instructional program coherence to a greater or lesser degree. Similarly, calls for systemic reform (Consortium for Policy Research in Education, 2000; Fuhrman, 1993; Smith & O'Day, 1991) and greater attention to the coordination of local, state, and federal policies could conceivably assist instructional program coherence within schools, but only if each individual policy reinforced program coherence.

Why Should Instructional Program Coherence Promote Student Achievement?

Theory and research in the fields of learning, motivation, organizational productivity, and school effectiveness suggest that instructional program coherence should assist student achievement in two ways: by helping teachers to work more effectively on problems of school improvement and by directly increasing student engagement and learning.

Assisting Student Learning and Engagement

Research on learning and cognition indicates that students of all ages are more likely to learn when their experiences connect with and build on one another (Greeno, Collins, & Resnick, 1996; Mayer & Wittrock, 1996; Bransford, Brown, & Cocking, 1999). To the extent that experiences are disconnected, it is more difficult for students to incorporate new understandings into prior knowledge and to alter prior knowledge when necessary. Studies in cognitive science indicate that learning takes time and requires recurring opportunities to practice and to apply knowledge and skills in new contexts. Material learned through short-term exposure and only in reference to a limited context is less likely to be retained and transferred to other settings.

In comparison to disconnected, short-term experiences, integrated experiences that are sustained long enough for successful completion provide greater clarity about what is required for mastery and how prior knowledge can be applied to future questions. Students learning to read, for example, are more likely to gain basic skills and the confidence to tackle more challenging tasks if they learn in settings where all of their teachers assist their reading in a consistent manner. In contrast, when there is little connection among past, present and future reading activities and when experiences are too brief to allow for mastery, it is more difficult for students to process the information.

Most of the research on the importance of connected learning experiences and the application

of ideas across multiple contexts comes from studies on instruction within classrooms. But it is reasonable to think that those theories and insights apply to learning that occurs across various classrooms and to learning that occurs as students move from one grade to the next.

Instructional program coherence may also assist student motivation. Research on motivation suggests that students are more likely to engage in the difficult work of learning when curricular experiences within classes, among classes, and over time are connected to one another (Pittman, 1998; Newmann, 1981). As explained, coherent instruction develops competence more effectively than incoherent instruction. When children see themselves developing competence, they are more motivated to work, because fulfilling the basic human need for mastery builds confidence that exerting effort will bring success (Ames & Ames, 1984; Blauner, 1964; Kanfer, 1990). In contrast, when faced with incoherent activities, students are more likely to feel that they are targets of apparently random events and that they have less knowledge of what should be done to succeed. Such feelings reduce student engagement in the hard work that learning often requires. Thus incoherent activities undermine opportunities to gain mastery and the confidence that motivates further learning.

Together these points suggest that where curriculum, instruction, and special programs are coordinated one can expect enhanced student achievement. More coherent experiences can provide absorbing activities that increase students' motivation to engage in learning and offer improved opportunities for cognitive processing.

Assisting Teacher Effectiveness

Instructional program coherence might also be expected to assist teacher learning and effectiveness. According to the research on learning and motivation summarized earlier, we would expect that teachers who participate in coherent professional development experiences, as opposed to short-term, unrelated activities, are more likely to learn from those experiences and to integrate that new knowledge into their teaching. In addition, research on organizations and effective management indicates that professionals who work together on integrated activities aimed at clear goals produce higher quality goods and services (Lawler, 1990; Wohlstetter, Smyer, & Mohrman, 1994). One reason for this is that coordination of activity amplifies workers' access to and use of technical resources and expertise. For example, if teachers within a grade level pool their knowledge on the most effective ways to use cooperative learning in the study of mathematical estimation, each teacher has an opportunity to improve his or her skill in applying cooperative learning. Another reason is that connecting the work of various teachers to common purposes and practices that are pursued over an extended period gives teachers' work more meaning, thereby increasing their motivation and commitment to reach goals. In contrast, when teachers know from prior experience that initiatives are introduced and abandoned before they are substantially incorporated, it makes little sense to expend much effort to change one's practice.

These points on student learning and engagement and teacher effectiveness are consistent with research on organizational factors that promote school effectiveness, including research on total quality management (Consortium on Productivity in the Schools, 1995; Pallas & Neumann, 1995), effective schools (Purkey & Smith, 1983), high-capacity schools (King & Newmann, 2000), Catholic high schools (Bryk, Lee, et al., 1993), and the differences between public and private schools (Chubb & Moe, 1990). Such studies argue the importance of a sustained organizational focus, staff agreement on clear and specific goals, more common academic expectations and curriculum for students, teacher collaboration and collective responsibility for meeting goals, and a consistent climate of positive supports and high expectations for all students and staff. Each of these elements is reflected in one or more of the indicators that we propose for instructional program coherence.

Study Context, Design, and Data

Our central empirical question was whether elementary schools[1] with improving instructional coherence showed improvements in student achievement over multiple years. Recent CPS policy initiatives, including high-stakes testing and placing of schools on probation, have prompted elementary schools to try a variety of approaches to raise students' standardized test scores. In addition, external organizations have involved schools in a variety of improvement interventions. The abundance of improvement activity in Chicago provided a fitting opportunity to

examine the extent to which schools channeled their efforts into coherent instructional programs and whether that, in turn, resulted in improved student achievement. We undertook a combination of statistical analyses and field studies to investigate these questions.

In trying to assess the strength of instructional program coherence within schools, it is unreasonable to expect that all elements of a school can be fully coordinated and aligned, or that a school can be so disorganized as to show no coherence at all. Because many factors contribute to instructional program coherence, our judgments about school coherence were made on a continuum from low to high, depending on how many indicators were met and to what degree.

Samples and Data Collection

In 1994 and 1997, surveys with items measuring instructional program coherence were distributed to teachers in all Chicago public elementary schools by the Consortium on Chicago School Research. We used data from the 222 elementary schools that participated both years. The surveys involved 5,358 teachers in 1994 with valid responses on the coherence items and 5,560 teachers, also with valid responses, in 1997, with an average of 24 teachers per school in 1994 and 25 teachers per school in 1997.

We used student achievement data from the Iowa Tests of Basic Skills (ITBS) in reading and mathematics, which were given to all students in grades 2 through 8 in the same 222 schools from 1993 through 1997. The number of students who took the tests varied between grade levels, years, and the subjects of reading and mathematics, but the average number of students taking the tests in any year was 81,493, with an average of 367 students per school.

We conducted field studies of 11 elementary schools representing a diversity of approaches to school improvement among external partners participating in the Chicago Annenberg Challenge (CAC). The CAC was a large-scale, five-year initiative supporting whole-school efforts to improve student learning, in part by addressing three critical issues: school and teacher isolation, school size and personalism, and time for learning and improvement. None of the schools were specialty schools or magnets. They were located in neighborhoods that reflected a range of socioeconomic resources, although most struggled against high rates of poverty and social stress. Six of the schools enrolled primarily African American students, two enrolled primarily Hispanic students, and three enrolled racially mixed student populations with Hispanic majorities.

Each of the 11 schools was studied by a two-person research team during the 1996–1997 school year. The baseline school visits involved about 50 hours of observation and interviewing. Researchers observed and recorded language arts and math lessons in two classrooms each in grades three, six and eight to create a pool of 12 observations. They also sat in on grade and committee meetings taking place on the days when they were in the school. All observed teachers were interviewed, as were school curriculum coordinators, improvement program leaders, and the school principal. We also interviewed local school council and union representatives. Interviewees were asked about school-improvement goals, activities, and priorities; the extent to which goals were held in common and agreed to by staff; and instructional objectives and coordination. Interviewed teachers were asked additional questions about their instructional goals and practices. We also asked all staff to discuss work norms, relationships among teachers, staff development efforts, and school-community relations. In addition to the baseline school visit, one researcher returned to the school several times to collect academic tasks and work samples[2] from the observed teachers, an informal process that generally added to the team's school knowledge. Finally, the team assembled and analyzed key school documents, including the annual school improvement plan, reports related to their participation in the CAC, data on student achievement, and organizational profiles based on school survey data analyzed by the Consortium on Chicago School Research. Drawing on all their school visits and data, each team produced an extensive school report describing and analyzing the school's priority improvement goals and actions, governance and operations, learning climate, instructional program and practices, professional development and community, and parent and community relations. We used those reports to assess the extent of instructional program coherence in each school.

Measures

Survey measures

Several items on the surveys were used to construct measures of teachers' perceptions of school

program coherence. Survey items from 1994 were as follows:

To what extent do you agree or disagree with each of the following statements (strongly disagree, disagree, agree, strongly agree)?

- *You can see real continuity from one program to another in this school.*
- *Many special programs come and go in this school.* [reverse scored]
- *Once we start a new program, we follow up to make sure that it's working.*
- *We have so many different programs in this school that I can't keep track of them all.* [reverse scored]

Additional items were included in the 1997 measure of school coherence:

To what extent do you agree or disagree with each of the following statements (strongly disagree, disagree, agree, strongly agree)?

- *Curriculum, instruction, and learning materials are well coordinated across the different grade levels at this school.*
- *There is consistency in curriculum, instruction, and learning materials among teachers in the same grade level at this school.*
- *Most changes introduced at this school have little relation to teachers' and students' real needs and interests.*
- *Most changes introduced at this school help promote the school's goals for learning.*

To what extent have coordination and focus of the school's instructional program changed in the past two years at your school (worse, no change, better)?

To allow for a direct comparison of teachers' responses from 1994 to 1997, we mathematically equated common items in the two surveys by using Rasch Rating Scale analysis (Wright & Masters, 1982). The equating process allowed us to develop measures that were equivalent for both years (i.e., a score of 5 represented the same level of coherence in both 1994 and 1997). It also allowed us to discern whether responses to the additional items in 1997 followed a different pattern than did those in the 1994 measure (i.e., whether they tapped a different underlying construct).[3] The new items did not perform differently from the common items, indicating that the measure was not substantively different in 1997 and 1994.[4] The reliability of the 1994 measure was .64; the reliability of the 1997 measure was .82.[5] The measures were then fit to a 10-point scale. Empirical Bayes estimates of average school coherence were computed through hierarchical linear models to produce a measure of each school's level of instructional program coherence in 1994 and in 1997.[6]

We analyzed the relationship between the survey measures of coherence and the observers' ratings based on the 13-point rubric in the 11 schools studied. We found a correlation of .70 between these measures. The correlation assured us that our measures had tapped important organizational differences among schools. Thus we had reason to think that the organizational differences identified in the field studies would generalize more broadly across elementary schools in the CPS.

Achievement measures

We measured academic achievement by using the ITBS in reading and in math. The various forms and test levels of the exam taken by students in grades 2 through 8 from 1994 to 1997 were equated through Item Response Theory. The result was a score, in logits, for each student that could be compared to other students' scores regardless of the form or level of the test that they took (Bryk, Thum, Easton, & Luppescu, 1998; Van der Linden & Hambleton, 1997). On average, students' test scores between 1993 and 1997 increased by .6 logits per year. Therefore, we considered each .6 logit change as a change equivalent to one year of learning. This number is approximate, however, as the average gain per year varies by grade level, with lower grades averaging gains of about .7–.8 logits per year and upper grades about .5–.6 logits per year.

Qualitative measures

We developed a rubric that assessed the extent of instructional program coherence in a school according to 13 indicators capturing the major components of our definition. Each school was rated on each indicator by one of this report's authors and by the lead researcher for the school on the basis of summaries of classroom observation and interview data contained in the school's field report as the primary evidence for the rating.[7] All indicators were scored on a 4-point scale (1 = *not at all,* 4 = *to a great extent*). The specific criteria for each indicator's rating are included in the appendix. On average, 93% of the initial ratings from a school were either in precise agreement or off by 1 point.

When the two raters disagreed, they discussed the ratings and evidence until they reached agreement on the rating. We show the indicators and each school's final ratings in Table 2.[8] Because our definition of instructional program coherence developed and refined as our analytic work proceeded, the rubric did not measure two final indicators—teacher hiring and evaluation practices—because suitable data were not available.

Statistical Analyses

The central question in our statistical analyses is whether schools with improving instructional coherence also show improvements in student achievement. We employed a three-level latent variable hierarchical linear model (HLM) to assess the relationship between changing levels of instructional program coherence and elementary school achievement trends.[9] We controlled for both the initial school achievement level and the initial level of instructional coherence. In this way we could assess, regardless of where schools started, whether efforts to improve the coherence of instruction culminated in improvements in student learning. These analyses also took into account other significant characteristics of the schools that were associated with both coherence and student achievement trends.[10] Thus we could assess the effects of coherence net of these other factors, including size of school enrollment, racial/ethnic composition of a school, students' socioeconomic status, and the school's student mobility rate.[11]

The Level 1 dependent variable was student ITBS scores, in logits (Rasch-equated ITBS scores). The unit of analysis was students, nested within years, nested within schools. In the model we introduced adjustments for the various grade levels taught in the elementary schools (at Level 1); possible time trend changes in student composition (at Level 2); and other stable school characteristics (at Level 3). The latent variable analysis allowed us to control for differences among schools in their base-year mean achievement as we analyzed the effects of the changing levels of program coherence on schools' test score trends.

The Level 1 (student-level) model was

$$\begin{aligned} Y_{ijk} = {} & \Pi_{0jk} + \Pi_{1jk}\,(\text{Grade 2}) + \Pi_{2jk}\,(\text{Grade 3}) \\ & + \Pi_{3jk}\,(\text{Grade 4}) + \Pi_{4jk}\,(\text{Grade 6}) \\ & + \Pi_{5jk}\,(\text{Grade 7}) \\ & + \Pi_{6jk}\,(\text{Grade 8 dummy}) + e_{ijk}, \end{aligned}$$

where Y_{ijk} is the ITBS score of student i in year j in school k ($j = 1993 \ldots 1997$); Π_{0jk} is the average ITBS score of school k in year j, controlling for the percentage of students in each grade at the school that year; $\Pi_{1jk}, \ldots \Pi_{6jk}$ are the average difference in ITBS scores of each grade compared to fifth grade, fixed across schools; and e_{ijk} is the unique error associated with student i (i.e., how student i is different from other students in her grade in her school).

The Level 1 model produced a measure of mean achievement for each school for each year that could be fairly compared to those of other schools, regardless of the grade levels served. Each student's score was predicted with dummy variables representing grade levels (Grades 2 through 8, with grade 5 as the excluded group). The dummy variables were grand-mean centered, and their effects were fixed. As a result, the intercept from the Level 1 model, Π_{0jk}, represented the adjusted mean student achievement for school k in year j, controlling for the percentage of students at each grade level in that school in that year. The intercept from the Level 1 model served as the dependent variable in the Level 2 model:

$$\begin{aligned} \Pi_{0jk} = {} & \beta_{00k} + \beta_{01k}\,(\text{Year}) \\ & + \beta_{02k}\,(\%\ \text{Low Income Students}) \\ & + R_{0jk}, \end{aligned}$$

where β_{00k} is the adjusted mean ITBS score for school k in 1994; β_{01k} is the average yearly growth in mean ITBS scores in school k from 1993 to 1997; and β_{02k} is the relationship between the percentage of low-income students and school mean ITBS scores, fixed across schools.

The purpose of the Level 2 model was to produce estimates of the yearly change in average achievement for each school. The values for Π_{0jk} from the Level 1 model were predicted with a linear variable representing the year and another representing the percentage of low-income students in the school that year. The year variable discerned the time trend in mean achievement for that school. It was centered around 1994, where $1993 = -1$, $1994 = 0$, $1995 = 1$, and so on, so that the intercept, β_{00k} of the equation, represented average achievement for school k in 1994, and the coefficient for the year variable represented the average yearly change in mean achievement in school k from 1993 to 1997. The year prior to 1994 was included as a base year so that any change in achievement that had begun to occur

prior to measurement of coherence could be controlled. One time-varying demographic variable, percentage of low-income students, was entered at Level 2 to capture large socioeconomic changes in the student body that might have occurred across the years. Other demographic variables were entered as controls at Level 3 because they were measured on only one occasion, at the same time as the initial measurement of school coherence, 1994.

The coefficients from the grade-level dummy variables at Level 1 ($\Pi_{1jk} \ldots \Pi_{6jk}$) were also predicted with the year variable so that scores would not be influenced by possible trends in student performance that differed by grade level (e.g., $\Pi_{1jk} = \beta_{10k} + \beta_{11k} * \text{Year}$). Those effects were fixed across schools.

At Level 3, the intercept, β_{00k}, and the slope associated with the year variable, β_{01k}, from the Level 2 models were predicted with variables representing the level of coherence in the school in 1994, change in coherence from 1994 to 1997, and school demographic and structural variables. Coherence in 1994 was entered as a control variable in the prediction of changing achievement levels:

$$\begin{aligned}\beta_{00k} = {} & \gamma_{000} + \gamma_{001}\ (\text{coherence in 1994}) \\ & + \gamma_{002}\ (\text{mean student SES}) \\ & + \gamma_{003}\ (\text{African-American school}) \\ & + \gamma_{004}\ (\text{Hispanic school}) \\ & + \gamma_{005}\ (\text{mixed minority school}) \\ & + \gamma_{006}\ (\text{integrated school}) \\ & + \gamma_{007}\ (\text{school size}) + \gamma_{008}\ (\text{mobility rate}) \\ & + \gamma_{009}\ (\text{change in coherence 1994–1997}) \\ & + U_{0k}\end{aligned}$$

$$\begin{aligned}\beta_{01k} = {} & \gamma_{010} + \gamma_{011}\ (\text{coherence in 1994}) \\ & + \gamma_{012}\ (\text{mean student SES}) \\ & + \gamma_{013}\ (\text{African-American school}) \\ & + \gamma_{014}\ (\text{Hispanic school}) \\ & + \gamma_{015}\ (\text{mixed minority school}) \\ & + \gamma_{016}\ (\text{integrated school}) \\ & + \gamma_{017}\ (\text{school size}) + \gamma_{018}\ (\text{mobility rate}) \\ & + \gamma_{019}\ (\text{change in coherence 1994–1997}) \\ & + \gamma_{0110}\ (\beta_{00k}) + U_{0k}\end{aligned}$$

To examine the relationship between change in instructional program coherence and change in mean ITBS scores, the coefficient of interest was γ_{019}. Because average growth in school achievement may depend on student achievement levels in the base year, the latent adjusted mean 1994 achievement in school *k*, β_{00k}, was entered as a predictor in the HLM model for the achievement trend, β_{01k}. Therefore, γ_{019} represented the relationship between change in coherence and yearly growth in school mean ITBS scores, controlling for the base achievement level of the school in 1994. The control for 1994 achievement may have produced an overly conservative estimate of the relationship between change in coherence and change in school improvement. However, it allowed for certainty that any observed relationship was not due to a relationship between school achievement in the base period and coherence change (i.e., it might be more difficult for low-achieving schools to show improvement in school coherence), or to improvement in test scores that began before the first measurement of school coherence.

Is Instructional Program Coherence Related to Student Achievement?

We found a strong positive relationship between improving coherence and improved student achievement. Schools that improved their instructional program coherence between 1994 and 1997 demonstrated improved student test scores over the same period of time. There was also a positive cross-sectional relationship between instructional program coherence and student achievement in 1994. The coefficients for the cross-sectional relationship between coherence (on a 10-point scale) and student achievement (in logits) were .078 in reading and .086 in math. The coefficients for the relationship between change in coherence from 1994 to 1997 and average yearly achievement growth were .012 in reading and .014 in math.[12] Results from the school-level prediction of school achievement in 1994 and the latent variable regression prediction of change in achievement from 1994 to 1997 are presented in Table 1.[13]

Figure 1 graphically compares the change in mean ITBS scores among schools that declined in coherence to those among schools that improved in coherence or stayed the same. The numbers in Figure 1 are based on the coefficients in the bottom half of Table 1 but translated into concrete terms. For ease of interpretation, logits were changed to "years of learning," with 1 year

TABLE 1
HLM Coefficients: Prediction of 1994–1997 School Achievement Growth with Change in Coherence

		Reading coefficients		Math coefficients	
DV	Predictor	Regular	Standardized	Regular	Standardized
Intercept:	Intercept	−.423***		−.150***	
1994 School	Program coherence, 1994	.078*	.095	.086*	.108
Achievement	Student social status, 1994	.367***	.360	.302***	.308
	African-American school, 1994	−.140**	−.135	−.190***	−.190
	Hispanic school, 1994	.101	.052	.132	.071
	Mixed minority school, 1994	.298**	.201	.264**	.185
	Integrated school, 1994	.469***	.352	.469***	.366
	School enrollment, 1994	−.000	−.059	−.000	−.072
	Mobility rate, 1994	−.003*	−.119	−.002	−.082
	Change in coherence, 1994–1997	.077*	.093	.064	.081
Slope: Yearly	Intercept	.023***		.023***	
Change in Mean	Latent 1994 achievement	−.001	−.027	−.032**	−.432
Achievement	Program coherence, 1994	.006	.199	.006	.102
1994–1997	Student social status, 1994	.009	.242	.003	.041
	African-American school, 1994	.002	.053	−.007	−.095
	Hispanic school, 1994	.003	.043	.001	.007
	Mixed minority school, 1994	−.017	−.313	−.009	−.085
	Integrated school, 1994	−.002	−.041	.011	.116
	School enrollment, 1994	−.000	−.189	−.000	−.097
	Mobility rate, 1994	−.000	−.112	−.000	−.089
	Change in coherence, 1994–1997	.012**	.398	.014**	.238

* $p < .05$. ** $p < .01$. *** $p < .001$

of learning calculated as .6 logits. Since we were interested in the change over a 3-year period, 1994 to 1997, we multiplied the yearly effect by 3. As shown in Figure 1, on average, Chicago public schools showed gains in test scores of 12–13% in both reading and mathematics from 1993 to 1997. Schools that declined in coherence lost ground, however, relative to other CPS elementary schools over the same period. In contrast, schools that showed substantial improvement in coherence achieved average ITBS scores that were almost one fifth of a year of learning higher in 1997 than in 1994 (19% in reading and 17% in math). A test score gain of one-fifth year is equivalent to about two additional months of schooling per year, which is substantial. It constitutes almost twice as much improvement in test scores as that which occurred in schools with no change in instructional program coherence, equivalent to about one month more schooling per year.

How Schools Achieved Stronger Instructional Program Coherence

Analysis of the field reports indicated substantial variation in instructional program coherence, as is shown in Table 2. Three schools rated close to the highest possible score of 52, but the total ratings for eight of the eleven schools were 33 or below, suggesting that strong instructional coherence is not common among Chicago elementary schools.

Schools that achieved stronger coherence benefited from principals and other key actors who directed resources toward a clearly articulated instructional program framework. We now discuss that leadership, the development of those frameworks, and some key strategies used to support stronger coherence among the field site schools.

School Leadership for an Instructional Framework

Stronger instructional program coherence was rooted in a principal's decision to adopt or develop a schoolwide instructional program framework and to make it a priority. We observed both democratic and autocratic approaches to leadership that advanced such frameworks. All of the principals of the high-scoring schools shared a conviction that a more common approach to in-

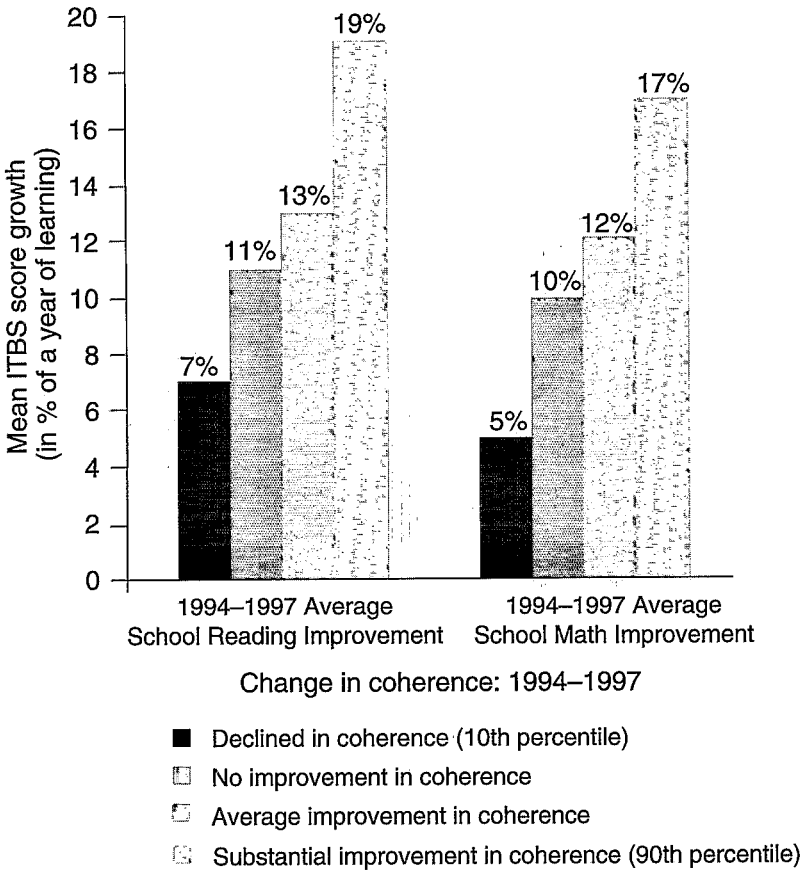

FIGURE 1. *Growth in average school ITBS scores by change in coherence from 1994 to 1997 (controlling for school demographics and coherence in 1994).*

struction would assist student achievement. Noted one principal, "You will not have an effect if you are just working with five or six teachers; you have to have 20 teachers to make a difference."

In two of the highest-scoring schools, Chelsea and Ackerman, principals led staff to collectively adapt and refine an instructional program framework. For four years Chelsea's principal worked with an external partner and with teacher leaders to implement a framework for literacy diagnosis, development, and assessment based on the Reading Recovery program. Every teacher in the school received intensive training in the model. The principal made it clear that she wanted all teachers, regardless of grade, subject, or bilingual assignment, to work with a specific conception of literacy development and to collaborate with peers in using it. The collaboration was more explicit than an agreement among teachers to "teach narrative and expository writing." Instead, it required teachers to agree on which materials to use, which instructional strategies to apply to distinct forms of writing, how to formulate grade-level expectations, and how to recognize various stages of accomplishment. In this way and others, Chelsea teachers were supported and prodded to work beyond their own classrooms in order to implement a systemic conception of instruction and literacy development.

Leadership at Ackerman also emphasized the democratic establishment of an instructional framework. Ackerman served students from extremely poor homes. Due to chronically low student achievement, the school had been on academic probation for several years. Consequently, the staff decided to adopt a direct instruction (DI) program modeled on the DI Program used in Houston, Tex., which some staff had traveled to observe (Adams & Engelmann, 1996; American Federation of Teachers, 1998). Explained one staff member, "We had a problem with our test scores.

(Text continues on page 310)

TABLE 2
Instructional Program Coherence Rubric Indicators and School Ratings

Rubric Indicators	Ackerman	Bishop	Chelsea	Hartford	Knoll	Larkin	Mathews	Sparrow	Templeton	VanDyke	Wilson
1. Teachers within a grade purposely link their curriculum (including arts, health, library, and computers) to stated learning goals.	4	3	2	3	3	3	3	2	2	2	2
2. Teachers within a grade use common instructional strategies.	4	4	3	2	3	2	2	2	2	2	1
3. Teachers within a grade use common assessment strategies.	4	4	3	3	2	4	2	2	2	2	2
4. Teachers coordinate curriculum and assessments to avoid repetition and to offer students new and more complex aspects of subject matter as they move from grade to grade.	3	4	3	2	2	3	2	2	2	1	1
5. School sponsored support programs, such as remedial instruction, assemblies, field trips, tutoring, and parent education, are linked to the curriculum, instruction and assessments of the school program.	3	2	3	2	2	2	2	2	2	2	3
6. Professional development for staff supports the implementation of common curriculum, instructional strategies and assessments.	4	4	3	3	2	2	2	2	1	2	1
7. Professional development programs are sustained over time.	4	4	4	2	3	2	2	1	1	2	1

8. The school strategically accepts and refuses programs and initiatives in a manner that supports staff focus, program continuity and ongoing improvement.	4	3	4	1	1	2	2	1	1	2	1
9. School improvement planning and assessment directly address the school's progress in providing a common, coordinated, and sustained school program.	4	3	4	3	3	3	3	2	1	2	2
10. Curriculum remains reasonably stable over time and thus provides teachers sustained opportunities to learn how to teach it well.	4	4	4	3	2	2	2	2	3	2	2
11. Assessments remain reasonably stable over time and thus provide teachers sustained opportunities to learn how to use them well.	4	4	4	3	2	2	2	2	3	2	2
12. Teaching assignments remain stable enough over time that teachers have sustained opportunities to learn how to teach a particular group of students.	3	2	3	2	3	2	4	4	4	3	3
13. Key program leaders and positions remain stable over time so initiatives can be supported and developed.	4	4	4	2	3	2	2	4	3	2	2
Score totals	49	44	43	31	31	31	30	28	27	26	23

Note: Names used are pseudonyms to maintain school confidentiality.

We came together as a group to decide on the best method to get us out of the hole we were in. Direct instruction has worked and we are still working with it." To supplement the direct instruction program, Ackerman funded training and development of eight grade-level teacher-literacy leaders, who helped peers to build classroom libraries from which students would regularly select books for reading and writing. The fully articulated instruction and assessment scheme provided by the direct instruction program, along with schoolwide implementation of the literacy/library supplement, were leading reasons for Ackerman's high rating on the field study rubric. Every teacher in the school was trained in these frameworks and used them daily. Not everyone would agree with Ackerman's decisions to adopt a direct instruction framework. But staff considered the shared instructional framework of specified strategies for teaching and assessment a significant improvement over past practices.

Not every school developed instructional frameworks democratically. In Bishop, and to a lesser extent Hartford and Larkin, principals or administrative teams mandated that teachers use purchased frameworks; teacher responses were mixed. Nonetheless, those schools had highly-to-moderately coordinated instructional programs emphasizing shared instructional strategies and assessments, as well as sustained staff development aimed at consistent implementation of the frameworks.

Principals of the less-coherent schools did not seek to organize their instructional programs around common frameworks, and their schools were characterized by norms of individual teacher autonomy over curriculum materials, instructional strategies, and assessment. For instance, the principal at Sparrow School, intending to support teacher motivation and innovation, was reluctant to constrain teachers' approaches to instruction. She explained, "I don't say no to many people or to many things. . . . We try to bring in new ideas and new methods, new strategies." Approaches to literacy at Sparrow differed from classroom to classroom and included whole-language approaches, direct instruction approaches, and a range of mixed practices.

Another school with low coherence scores was Wilson. Located in an economically mixed Chicago neighborhood, the school was well regarded by parents and the community. Wilson staff clearly shared a priority goal—to improve their students' standardized test scores. They had many programs and supports that could conceivably help them reach that goal, but the resources were not organized into an instructionally coherent program for students or teachers. Classroom observations and follow-up interviews rendered little evidence of a framework beyond a curriculum of items similar to those on the standardized tests. It was up to each teacher to decide what parts of such a "curriculum" to teach and how to teach them. Different curriculum materials and instructional approaches were used both within grades and across the school. The statement by one teacher that "[t]eachers here have the same frustrations, but they deal with them independently in their classes within the context of the [test] goal" was reiterated in similar terms by most members of the staff.

In other low-coherence schools, weak instructional program coherence reflected not simply the lack of an instructional program framework but diffuse and uncoordinated instructional leadership (Mathews, Templeton) or a clear lack of leadership (VanDyke). Many staff members in those schools seemed wary of using any single instructional framework, feeling that because "some kids thrive on one method and some on another method" it was best to allow teachers as much choice and discretion as possible

In one school the principal's imposition of a common instructional framework had negative consequences. Bishop elementary school, which scored high on both survey and field-based measures of instructional program coherence, had much in common with Ackerman. It enrolled students from a very impoverished community, had been on academic probation since the sanction was first implemented, and had adopted a direct instruction program to focus instruction throughout the school. Many at the school saw student achievement gains from 1994 to 1997 as a clear outcome of this approach. But Bishop was a very troubled organization. A large number of teachers opposed the exclusive use of the direct instruction method. As one teacher observed, "Direct instruction wasn't something the teachers selected. It was selected for us." Researchers reported teachers' perceptions that the principal had become increasingly autocratic and distant, with a waning commitment to school improvement. Several teachers reported declining motivation to work together because they saw little opportunity to

voice or implement their ideas. Other teachers were demoralized and looking for work in other schools. Bishop raises an important point. Strong school-level leadership is central to the development of stronger instructional program coherence, but coherence achieved by administrative fiat is of questionable value when it suppresses the development of equally essential supports for learning, such as teachers' professional community and shared ownership of an instructional program. We provide additional cautionary notes on the development of coherence later in this article.

Partner Support for Coherence

A school principal's actions to institutionalize a common instructional framework are central to stronger coherence, but other actors can also provide leadership that promotes coherence. As participants in the Chicago Annenberg Challenge, each of the fieldwork schools was linked to an external partner responsible for helping the school to improve. Chelsea, which adopted its partner's program as the central strategy for school improvement, showed that an external partner can significantly assist a school to achieve stronger instructional program coherence. The school's partner was instrumental in training the entire staff in the literacy framework, training full-time literacy coordinators, helping to develop a schoolwide leadership team that assumed ownership of the school improvement model, and helping teachers to carefully analyze their own progress and their students' progress. This focused, long-term partnership was not typical, however, and enhancing instructional coherence was not a central objective for most partners in the fieldwork sample. More commonly, partners guided the development of particular programs or initiatives, for example, parent involvement or the integration of arts into the curriculum. In many of the low-scoring schools, some teachers had no idea their school had an external partner. Several schools had multiple external partners who never coordinated their activities (Newmann & Sconzert, 2000).

Organizing Resources to Strengthen Coherence

The more coherent field study schools were not smaller, did not have significantly greater fiscal resources, and did not have significantly more staff members per student than those with lower-rated instructional program coherence. Rather, the higher-rated schools used a core set of strategies to harness available resources and staff energy toward a common instructional framework and priority school improvement goals. Those strategies included (a) investing in technical resources that assisted whole-school development, (b) focusing staff collaboration on the common instructional framework, and (c) channeling community resources to support a core instructional program.

Investing in schoolwide use of technical resources

A feature that distinguished the high- and low-coherence schools was significant investment in instructional materials and programs, including staff training and development, that were grounded in a particular conception of instruction and—perhaps more important—implemented schoolwide. Ackerman and Bishop invested in direct instruction programs that provided published, comprehensive frameworks across subjects and grades as well as all necessary materials for lessons and staff training. In contrast, Chelsea's comprehensive literacy framework was more complex. It offered more flexibility in daily instruction and instructional materials, called for a greater range of technical resources, and demanded more extensive training. Hartford's approach was somewhat between the two models, involving teachers in continuing workshops and training to deliver a program of common curriculum units and assessments but lacking specific training in instructional strategies.

To foster progress and staff commitment, more coherent schools also funded program coordinators who directly assisted staff to implement instructional frameworks. Again, the strongest example of this was at Chelsea, whose facilitators offered after-school workshops, searched for materials, outfitted the resource center that supported the program, and routinely visited classrooms to observe, demonstrate, coach, and co-teach. But several other schools (Ackerman, Bishop, Larkin, and Mathews) also funded facilitators. Since highly trained coordinators are often recruited away from the schools that train them, schools' investment in such positions, while pivotal, can also be risky. We noted, for example, that low-scoring VanDyke had invested heavily to train and develop literacy coordinators, who left the school soon after completing the training.

The mid- and low-scoring schools did not use technically strong whole-school models and did

not employ well-trained school coordinators to offer continuing staff development. Instead, they tended to use more diffuse assistance and development strategies. For example, Larkin had made gains in coherence by instituting more common and coordinated curriculum and assessment materials. But it also purchased multiple reading programs and workshops that each involved small numbers of teachers. In other low-scoring schools (Sparrow, Templeton, and Wilson) principals spoke of making assistance "available" to teachers and inviting teachers to "ask for what they need." Many teachers in these schools participated extensively in school improvement activities, but their efforts were not focused and coordinated. In several cases, teachers reported that they were unaware of the improvement activities of fellow staff. Low-scoring schools with more diverse programs and investments also appeared to have greater problems following through on resources in which they had invested. Several had purchased materials and computer technology that they believed could help students perform better on standardized tests. But these purchases were delivered without training, discussion, or assessment of how to maximize or evaluate their benefits and without a scheme for ensuring that they would be used in the manner intended. Only some teachers reported actually using the materials.

Staff collaboration within a common framework

Tighter coordination of instruction requires more than commitment to a schoolwide framework grounded in a strong technical base. It requires extensive, continuing communication among teachers, mutual assistance, and working together to improve instruction according to the framework. School leaders in the higher-scoring schools promoted such collaboration by establishing common planning periods for grade levels and across grade-planning groups, by forming "schools within schools" to facilitate more extensive collaborative relationships through smaller clusters of teachers, and by establishing representative teams and committees to deal with school governance issues. It is important to note that the structures alone were not sufficient to cultivate greater coordination and coherence. Rather, principals, program coordinators, and others worked to coax teachers into collaborative activity around core instructional goals and strategies. In schools with lower coherence scores, planning periods were not available or were seldom used for group work within a common instructional framework. Staff at one low-scoring school had recently abandoned common planning periods because few of the teachers used the periods for collaborative work and the periods complicated the schedule.

Coordinating community resources

Principals also faced the challenge of how to select and coordinate social resources, such as parent volunteers and programs sponsored by community agencies. Such programs seemed responsive to student needs or provided additional funds, or both, but staff comments often suggested a need to "get a better handle" on the programs. Most schools worked to mobilize parent involvement programs to emphasize reading and homework assistance. Because assistance of that kind was clearly connected to undisputed literacy goals, it generally posed no threat to instructional program coherence, though some programs were more strongly linked than others. But the impact of many community-sponsored programs on coherence was less clear, for example, adult-student mentoring, business partnerships, environmental projects, and museum and arts outings. Such programs, typically designed as short-term, stand-alone initiatives for adoption by any school, seemed less likely to connect to a school's particular instructional framework. Several principals in the mid- and low-scoring schools said that they rarely rejected such programs because they saw them as valuable opportunities to enlarge students' horizons and boost self-esteem through nonacademic pursuits. Whether such programs weaken instructional program coherence depends on how they are administered and managed. But if, as was observed in several of the low-scoring schools, they disrupt teachers' and students' progress on the main instructional framework, they weaken coherence and its potential outcomes. Principals in the higher-scoring schools seemed more ready to minimize such threats and to acknowledge that "[y]ou can, in fact have too many resources."

Summary Review of Empirical Findings

Our research results suggest that school improvement efforts that strengthen instructional program coherence can lead to increased student achievement. Our quantitative analysis using teacher survey responses shows positive connec-

tions between strengthening instructional program coherence and improving academic achievement in both reading and mathematics in a large number of schools. And correspondence between teacher survey responses and ratings by independent observers indicates that the strength of program coherence in individual schools can be reliably measured.

Schools in our field sample that ranked higher on instructional program coherence had stronger principal leadership than did lower-ranking schools. With the help of other instructional leaders and external partners, these principals instituted common instructional frameworks and supported them by investing in schoolwide technical resources such as high-quality curriculum and assessment materials. They promoted extensive collaboration among staff and focused community-based programs and resources on one or a few core schoolwide improvement goals. They sustained these efforts over a significant period of time (three or more years and counting). In contrast, leaders in lower-ranking schools often believed that schoolwide commitment to improved test scores was a sufficient mechanism for improved practice. New resources and collaborative effort in those schools were often significant but were spread across multiple programs and initiatives, each involving a limited group of faculty.

Cautions in the Pursuit of Strong Instructional Program Coherence

It is important to place strong instructional program coherence in perspective and to understand it not as the overriding task of school improvement or as a substitute for key supports for teaching and learning, but as a strategy for maximizing those supports. Strong instructional program coherence could, for instance, undermine the development of teachers' professional community if it insisted on such regimented instruction that teachers had no opportunity to exercise expertise or raise questions about selected methods or programs—as happened at Bishop. Similarly, teachers' professional development opportunities might be made so uniform as to prevent individuals from learning skills unique to their teaching situation or background. The pursuit of greater program coherence must respond to appropriate forms of differentiation and be receptive to new or altered programming for staff and for students when clearly necessary. Program stability is desirable because it allows for continuing learning and improvement. But the benefits of stability should not be invoked to sustain ineffective programs.

Moreover, our theoretical explanations of how instructional program coherence promotes student achievement could apply to many types of curriculums and instructional programs. A school could become highly coherent (and could even increase student scores on standardized tests) by instituting instructional frameworks that are narrowly focused on the most rudimentary academic tasks. But it would still be perceived by some or many as a school that denies students necessary opportunities for individual expression, higher-order thinking, or comprehensive understanding of a variety of subject areas—as at Bishop. Thus the ultimate value of strong program coherence will always depend on the perceived educational legitimacy of what students learn and how they learn it.

Finally, because we did not attempt to test a comprehensive model of all the factors that contribute to student achievement, but examined only the influence of instructional program coherence, we cannot say whether it is more or less important than other school-level variables that may influence student achievement, such as curriculum content, teacher expectations for students, or the strength of professional community among teachers. The relative influence of these variables as compared with instructional program coherence is simply not known. Based on our research we can, however, recommend that educators work to establish instructional program coherence as they seek to strengthen other supports.

Why It Is Difficult to Achieve Strong Instructional Program Coherence

Even when instructional program coherence is pursued in the context of other supports for school improvement, our data suggest that many schools will have difficulty. To understand the challenges involved in strengthening instructional program coherence, we outline several reasons that many schools have relatively weak coherence, based on our field studies, other studies of school improvement (Bryk, Sebring, et al., 1998; Newmann & Wehlage, 1995), the policy coherence literature (Cohen, 1995; Smith & O'Day, 1991), and a literature synthesis on school capacity building (King & Newmann, 1999). These sources include

explanations of weak program coherence that point to factors operating both within the school and beyond.

Factors Within Schools

Lack of consensus within a school in efforts to establish a clear focus often reflects demands for multiple and varied learning outcomes, such as good behavior, basic skills, advanced conceptual understanding, and higher self-esteem. Moreover, student diversity is usually assumed to require distinct program interventions for each group or problem (e.g., for students who are gifted-talented, at-risk, speak English as a second language, or need special education). This differentiation is reinforced by staff specialization and by categorical funding aimed at special groups or problems. The press toward separate programs for different learning goals and different students makes it difficult for teachers to work from a common instructional framework.

In addition, winning staff acceptance of a common instructional framework is often seen as an overwhelming task, because it requires continuing agreement, cooperation, and training on the part of both old and new staff. Incremental improvement involving small segments of the staff who work toward short-term goals seems more administratively manageable than trying to achieve long-term, schoolwide instructional coherence.

Finally, an uncertain knowledge base about how to effectively teach and assess student learning tends to encourage a trial-and-error approach rather than a common, coordinated approach to instruction. Unlike fields where research has produced highly reliable methods of diagnosis and intervention, such as medicine or engineering, educators face substantial uncertainty about how to proceed. Under such circumstances, it can seem reasonable to give each teacher considerable latitude in deciding how to teach rather than requiring a common approach. Although this perspective has merit, our evidence indicates that achieving coherence around a defensible framework does matter. There may not be one best framework for organizing instruction in all schools, but the presence of a school-specific framework can enhance student and teacher learning.

Factors Beyond Schools

Ideally, strong school leadership would steer a school toward greater instructional coherence and minimize the influence of the other factors mentioned earlier. But tendencies toward incoherence are reinforced by an increasing number of independent providers of school assistance, such as reform project leaders, professional development facilitators, technology consultants, and instructional material vendors. Incoherence is also aggravated by unaligned district and state policies and by rapid changes among them.

Independent providers of improvement programs and materials

Independent providers typically establish their impact and legitimacy by disseminating discrete, identifiable programs to many schools, not by helping individual schools to develop focused, coherent missions. Foundations, universities, and other providers usually have an interest in a particular program or topic, such as early childhood development, literacy, or classroom management. In our visits to schools, for example, we observed instances in which facilitators from various organizations worked extensively with a school staff but never talked or worked with one another to help the school focus and integrate their contributions.

Another obstacle is the nature of the education publishing industry. Education publishers tend to be rewarded for producing materials for separate subjects and distinct instructional approaches, rather than for comprehensive series integrating high quality materials for multiple subjects and grades. Some publishers offer coordinated materials for individual subjects, most commonly K–6 language arts programs. However, integration of instructional approaches across subjects is rare. Schools must shop strategically across multiple vendors to patch together an instructional program that includes some common elements.

Finally, both independent providers and publishers must recruit schools to join their efforts or to purchase their products and services. They often have minimal political or economic power to influence schools; as vendors in a market they must essentially persuade schools to let them in. To gain access and the trust needed to work with a school, an assistance organization or publisher must, in large measure, accept the school's priorities rather than insist that the school work toward stronger instructional program coherence.

School districts and states

Compared to independent providers of improvement programs and professional develop-

ment, districts and states conceivably have more clout to strengthen school instructional program coherence. But for several reasons, governmental authority is not exercised to achieve stronger coherence. Because debate persists on the degree of authority that parents, teachers, schools, school districts, and states ought to have to prescribe education programs, the actual power of districts and states to control school affairs is contested (Allington & Johnson, 1989; Bryk, Sebring, et al., 1998; Cohen, 1995; Fuhrman & Malen, 1991). For example, when schools choose to work with a variety of external partners, neither district nor state policy requires that the partners coordinate their efforts within schools. And when districts and states themselves offer professional development, participation by schools is often voluntary, in which case the district or state occupies a position similar to that of independent providers. Districts routinely offer a variety of professional development options from which individual teachers can choose, but rarely with a requirement or incentive for entire school staffs to pursue training together. Even when districts mandate professional development, programs are seldom designed to help school faculties develop understanding of and commitment to a common instructional framework.

One area in which districts and states have recently asserted authority is the promulgation of standards for curriculum and assessment. Yet the standards often consist of voluminous lists of discrete skills and items of knowledge and fail to communicate a common framework for instruction. Professional development aimed toward meeting dozens of standards for various subjects at various grade levels offers no common mission for a school except that each teacher teach well the list of specified items in each subject and grade level. Grade-level teams may work together to implement the standards, but such efforts are distinct from professional work focused on a common instructional framework that emphasizes connections between subjects or grade levels.

These observations are consistent with historical and sociological analyses of how the external environment influences schools (Rowan & Miskel, 1999; Tyack & Cuban, 1995). Research has shown, for example, that since the 1960s, federal and state governments have asserted greater authority and increased centralization. But at the same time, local communities have increased their authority through school site management. The lack of policy coordination between these levels exacerbates fragmentation. Thus weak program coherence is due partly to a system of political control that resists tight coordination and that includes frequent changes of leadership at all levels (Cohen, 1995; Hess, 1999). As a result, schools, in responding to their external policy contexts, have become far more complex organizations with increased funds and personnel dedicated to management and compliance (Scott & Meyer, 1994). Given the extent to which administrative resources must concentrate on managing complex organizations and a multitude of external demands and contexts, it is not surprising that instructional program coherence suffers.

Implications for Education Leaders and Policymakers

The most straightforward implication of these findings is that leaders in schools, in school improvement organizations, and in district, state, and federal agencies should give more deliberate attention to strengthening instructional program coherence within schools. The following activities could be helpful in various organizational settings:

- School principals could focus their improvement plans, professional development, and acquisition of instructional materials on a few core educational goals pursued through a common instructional framework. Shared schedules and stable teaching assignments could provide common planning time and sustained opportunity to build skills in implementing the framework. Teacher hiring and evaluation could emphasize skillful use of the framework. Grants and partnerships could be limited to those that contribute to implementation of the framework.
- Foundations and other organizations that support school improvement could emphasize coordination of improvement efforts within schools. A foundation that supplies funds for school improvement could require separate projects in literacy, math, and science to coordinate their efforts within each school. Improvement programs could be directed to clarify how recommended practices reflect common approaches to instruction and how teachers will have sufficient time to learn, adopt, and refine them. Staff development providers could insist on working with school teams rather than a few individual teachers and

could structure the work toward implementation of effective practices across grade levels rather than only in selected classes.

• District policy could emphasize instructional program coherence as a key dimension of school improvement plans. District-sponsored professional development could be organized around school teams that work on common instructional frameworks. Criteria for hiring and evaluation of principals and professional development for leaders could emphasize instructional program coherence. Administration of categorical aid programs and approval of external partnerships with schools could require coordination among programs. District curriculum standards and tests could be revised to reflect greater integration of learning outcomes across subjects and grade levels. Finally, an oversight committee could review district mandates and regulations to consider their effects on instructional program coherence within schools.

• Administration of state categorical aid programs could require that funds be used to support not just schoolwide programs but schoolwide programs that are focused and sustained over multiple years and that serve a clear instructional framework. State curriculum standards and tests could be revised to encourage greater integration of learning outcomes. An oversight committee could review state mandates and regulations to consider whether schools could become more coherent under such mandates.

Conclusion

In searching for ways to improve failing elementary schools, many reformers and school leaders resolved that adopting a range of new ideas and programs was the best strategy to spur positive change and to discover what works. The hope was that program variety, teacher choice, and incrementalism would combine to produce meaningful improvements. This article addresses the reasons that such a strategy may not often produce cumulative benefits. To improve student achievement, school staffs and the external organizations that work with them should aim to strengthen instructional program coherence. They can do this by working together to recognize both internal and external sources of incoherence and by directing resources to the development of a common instructional framework that guides and coordinates supports for teaching and learning throughout the school.

Since the sources of incoherence rest both within and beyond schools, strengthening instructional program coherence requires simultaneous effort from the bottom up and from the top down. Principals and teachers can be supported by efforts to minimize barriers to coherence that emanate from district, state, and federal school governance bodies and a growing market of independent service providers. If actions to strengthen instructional program coherence are integrated with efforts to develop other key supports for school improvement, schools can build and reinforce forms of staff competence and commitment that advance student learning.

APPENDIX

Program Coherence Rubric

1 Teachers within a grade purposely link their curriculum (including arts, health, library, and computers) to learning goals.

1 = Teachers within a grade do not connect their curriculum to these goals.
2 = Some teachers within a grade connect some of their curriculum to these goals.
3 = All teachers within a grade connect some of their curriculum to these goals.
4 = Teachers within a grade connect their entire curriculum to these goals.

2 Teachers within a grade use common instructional strategies.

1 = Teachers within a grade do not use common instructional strategies.
2 = Some teachers within a grade use some common instructional strategies.
3 = All teachers within a grade use some common instructional strategies.
4 = All teachers within a grade use many common instructional strategies.

3 Teachers within a grade use common assessment strategies.

1 = Teachers within a grade do not use common assessment strategies.
2 = Some teachers within a grade use some common assessment strategies.
3 = All teachers within a grade use some common assessment strategies.
4 = All teachers within a grade use many common assessment strategies.

4 Teachers coordinate curriculum and assessments to avoid repetition and to offer students new and more complex aspects of subject matter as they move from grade to grade.

1 = Teachers do not coordinate curriculum and assessments across the grades.

2 = Some teachers coordinate some curriculum and assessments across the grades.
3 = All teachers coordinate some curriculum and assessments across the grades.
4 = All teachers coordinate all curriculum and many assessments across the grades.

5 School-sponsored support programs, such as remedial instruction, assemblies, field trips, tutoring, and parent education, are linked to the curriculum, instruction, and assessments of the school program.

1 = Few to no support programs are linked to the curriculum, instruction, and assessments of the school program.
2 = Some support programs are linked to the curriculum, instruction, and assessments of the school program.
3 = Most support programs are linked to the curriculum, instruction, and assessments of the school program.
4 = Almost all support programs are linked to the curriculum, instruction, and assessments of the school program.

6 Professional development for staff supports the implementation of common curriculum, instructional strategies, and assessments.

1 = Professional development for staff does not support the implementation of common curriculum, instructional strategies, and assessments.
2 = Professional development for staff only weakly or sporadically supports the implementation of common curriculum, instructional strategies, and assessments.
3 = Professional development for staff regularly supports the implementation of common curriculum, instructional strategies, and assessments.
4 = Professional development for staff extensively supports the implementation of common curriculum, instructional strategies, and assessments.

7 Professional development programs are sustained over time.

1 = No professional development programs (or almost none) are sustained over time.
2 = Some professional development programs are sustained over time.
3 = Many professional development program are sustained over time.
4 = Almost all professional development programs are sustained over time.

8 The school strategically accepts and refuses programs and initiatives in a manner that supports staff focus, program continuity, and ongoing improvement.

1 = The school has many programs, and staff energy and attention are very fragmented. Thus the programs do not support staff focus, program continuity, or ongoing improvement.
2 = The school has many programs, but some attempts are made to focus staff energies and attention to support program continuity and ongoing improvement.
3 = The school is somewhat strategic in how it accepts and refuses programs so that they may support staff focus, program continuity, and ongoing improvement.
4 = The school is very strategic in how it accepts and refuses programs so that they may support staff focus, program continuity, and ongoing improvement.

9 School improvement planning and assessment directly address the school's progress in providing a common, coordinated, and sustained school program.

1 = School improvement planning and assessment generate long, disconnected lists of goals and assessments.
2 = Some school improvement planning and assessment addresses the school's progress in providing a common, coordinated, and sustained school program.
3 = Much school improvement planning and assessment addresses the school's progress in providing a common, coordinated, and sustained school program.
4 = A great deal of school improvement planning and assessment addresses the school's progress in providing a common, coordinated, and sustained school program.

10 Curriculum remains reasonably stable over time and thus provides teachers with sustained opportunities to learn how to teach it well.

1 = Curriculum is very unstable and frequently changes. Teachers have no sustained opportunity to learn how to teach it well.
2 = Curriculum is only partially stable over time. Teachers have sustained opportunities to learn how to teach some of it well.
3 = Curriculum is fairly stable over time. Teachers have sustained opportunities to learn how to teach much of it well.
4 = Curriculum is very stable over time. Teachers have sustained opportunities to learn how to teach most of it well.

11 Assessment remains reasonably stable over time and thus provides teachers with sustained opportunities to teach students how to succeed on them.

1 = Assessment is very unstable and frequently changes. Teachers have no sustained oppor-

tunity to teach students how to succeed on them.

2 = Assessment is only partially stable over time. Teachers have sustained opportunities to teach students how to succeed on some of them.

3 = Assessment is fairly stable over time. Teachers have sustained opportunities to teach students how to succeed on many of them.

4 = Assessment is very stable over time. Teachers have sustained opportunities to teach students how to succeed on most of them.

12 Teaching assignments remain stable over time.

1 = Teaching assignments are very unstable and frequently change.

2 = Some teaching assignments are stable while others frequently change.

3 = Many teaching assignments are stable over time.

4 = Most teaching assignments remain stable over time.

13 Key program leaders or leadership positions remain stable over time.

1 = Key program leaders or leadership positions are very unstable over time and frequently change.

2 = Some key program leaders or leadership positions are stable while others frequently change.

3 = Many key program leaders or leadership positions are stable over time.

4 = Most key program leaders or leadership positions are stable over time and rarely change.

Notes

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[1] This study is limited to elementary schools. We acknowledge that our approach to coherence may be more important to student achievement in elementary schools than in high schools, where within-subject coherence may be more important than a common framework applied across subjects. We hope that future research will investigate the importance of instructional coherence at various levels of schooling.

[2] The collected tasks and work samples were not part of our coherence analyses and are not elaborated on here. For more information see Newmann, Lopez, and Bryk, 1998.

[3] In 1997, the mean squared fit statistics for the common items were .61, .87, 1.1, and .93; those for the new items were .81, .99, 1.05, .76, and 1.03.

[4] We also constructed a 1997 measure of coherence without the additional items and compared that measure to those used in the analysis. It had a high correlation of .88 with the full 1997 measure of coherence, and its correlation with coherence in 1994 (.52) was almost identical to the correlation of the complete measure in 1997 with the 1994 measure (.53). We decided to use the full 1997 measure because of the increased reliability obtained by including the additional items.

[5] The 1997 measure was more reliable because of the additional items.

[6] Empirical Bayes estimates were produced through three-level hierarchical linear models, in which the first level was a measurement model, the second measured teachers, and the third measured schools.

[7] Official documents on curriculum and school improvement planning were valuable sources of school-level data, but the indicator ratings reflected what researchers observed and what they learned during interviews. For example, to assign a high score on the indicator "teachers within a grade use common assessment strategies," the researchers had to see or hear evidence of use of common assessment strategies from all of the observed and interviewed teachers.

[8] School names in Table 2 and in the text are pseudonyms.

[9] For details on latent variable HLM, see Raudenbush, Bryk, Cheong, and Congdon (2000), p. 207.

[10] In both 1994 and 1997, there were significant negative relationships between instructional program coherence and school size, the percentage of low-income students, and the percentage of non-White students. Class size showed a positive relationship with coherence, but it was not a significant predictor of student achievement and was not included in the final model. Instructional program coherence was not significantly related to the experience of teachers in the school in either year, so teacher experience was not included as a variable in the model. Coherence had a nonsignificant positive relationship with teachers' education (the percentage of teachers with a Master's degree) in 1994 ($r = .08$), and a marginally significant negative relationship in 1997 ($r = -.10$), but it was not related to student achievement and so was not included in the final model. Additional models were run with these excluded predictors (class size, teachers' education) to be sure they would not change our interpretation of the results. Their inclusion had virtually no effect on the coefficients representing coherence–achievement relationships.

[11] We do not include control variables for organizational characteristics or for types of instruction because we are examining the effect of instructional program coherence regardless of the content of instruction or of how coherence is achieved. We expect that efforts to increase program coherence will affect instruction, teacher learning, and other organizational characteristics, and we do not want to disregard those effects. This analysis provides the first empirical evidence that there is a connection between instructional program coherence and student achievement. Further studies may examine in more detail the mechanisms through which this relationship is achieved.

[12] An analysis of residuals was performed to be certain the relationships could not be attributed to outliers. This was confirmed. Only 5% of the cases in each analysis had standardized residuals less than –2 or greater than 2, and only one case in each analysis had a standardized residual greater than 3. No case had substantial leverage.

[13] Standardized coefficients were produced for Table 1 so that effect sizes could be discerned among predictors. Standard deviations for the two dependent variables (1994 achievement and yearly change in achievement from 1994 to 1997) were calculated through HLM models that were unconditional at Level 3 and had only the "year" predictor at Level 2. Grade-level dummies remained in these models because they were necessary for production of measures of mean school achievement that were independent of grade levels served by the school. Standard deviations for the independent variables were based on school-level statistics.

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