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If Small Is Not Enough . . . ?

The Characteristics of Successful Small High Schools in Chicago

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Table of Contents

Executive Summary 2

Introduction 3

What Matters for Strong Student Outcomes? 12

Interpretive Summary 17

References 19

Appendix A: *Description of the Sample* 22

Appendix B: *Survey Measures and Factors* 24

Appendix C: *Models Used in This Report* 25

Appendix D: *Qualitative Methodology* 31

Executive Summary

Since 2002 the Consortium on Chicago School Research, in collaboration with the Mills College in Oakland, California, has conducted a series of studies on the Chicago High School Redesign Initiative (CHSRI)—a partnership between Chicago Public Schools (CPS), the Gates Foundation, and local Chicago foundations to create approximately two dozen small high schools across the city.

This latest report in the CHSRI series describes the practices and characteristics of CHSRI schools with better than expected freshman-year course performance. Drawing on both qualitative and quantitative indicators across a sample of ten CHSRI schools, our analysis identified three conditions found in schools with comparatively high student achievement: strong teacher professional communities, deep principal leadership, and strong teacher influence. In addition, CHSRI schools with high achievement tended to provide a personalized and supportive environment for their students.

Through qualitative fieldwork, we also show how these characteristics work together in high achieving schools. Teacher professional communities that engage in collective work on academic improvement are supported by strong leadership in schools. Involved principal leadership is important for organizing and sustaining collective work, while teacher influence helps make it more relevant for schools' staff. Both of these supporting conditions are necessary to make collective work more meaningful.

This work highlights that how adults work together in small schools is a crucial factor in raising student achievement. In particular, it suggests that collective work on improving instruction is a key lever for raising achievement. In addition, it points to the benefits of balancing the direction and initiative provided by principals with teacher voice and leadership. Given that reducing size does not automatically lead to such developments, however, schools will need to intentionally focus on creating these key organizational characteristics.

Introduction

Maple High School and Wood Grove Academy have much in common. As small high schools created under the Chicago High School Redesign Initiative, both value creating personalized relationships for students and a collegial environment for teachers. Both also have school themes to guide curriculum development. Despite these similarities, however, the two schools differ in important ways. Their efforts to facilitate teacher collaboration illustrate one crucial difference. At Maple High the principal suggested to his staff that they create a model for peer classroom observations. He worked closely with teachers to develop the initial model and monitored its implementation. As the principal tracked its progress, he noted two challenges: teachers did not always give constructive feedback for fear of saying "mean things to each other," and they often had conflicting instructional philosophies. In response to these problems, the principal decided to add clear and explicit expectations of good instruction to the school's peer observation model. He gathered ideas about what those elements might be and brought them to the school's staff for discussion. Over several sessions of in-house professional development led by the principal, the school's staff identified the model of instructional practice they wanted to embrace for peer observation.

Wood Grove Academy's principal also wanted to develop teacher collaboration. According to the school's teachers, she created an atmosphere where they felt encouraged to observe peers' classrooms and share instructional practices. Despite this encouragement, collaborative practices existed, as one teacher described it, "only on paper," since no one monitored if or how teachers worked together. Furthermore, teachers reported that collective improvement activities were unfocused and often pulled people in several directions. In short, Maple High and Wood Grove Academy differed from each other on school characteristics such as principal leadership and professional community. In the first case of Maple High, the principal was actively involved in initiating and participating in collective improvement work. By contrast, the principal of Wood Grove Academy provided little direction for how to increase collaboration and teachers rarely worked together on sustained projects.

As urban districts increasingly turn to small school initiatives to address the persistent problems confronting high schools, reformers must consider how differences like those found in Maple High and

Wood Grove Academy are related to small schools' potential to improve student achievement.[1] Recent accounts of the impact of school size are mixed: while some studies find evidence supporting claims that small schools lead to better outcomes for students, others find that positive outcomes in small schools are inconsistent at best.[2] Are school characteristics like those found in Maple High and Wood Grove Academy related to differences in student achievement? If so, which characteristics are associated with high achievement? This report attempts to provide some initial answers to these questions through a study of the Chicago High School Redesign Initiative (CHSRI). Started in 2001, CHSRI aimed to open more than two dozen small high schools across Chicago. The Consortium on Chicago School Research at the University of Chicago, in partnership with Mills College in Oakland, California, has undertaken a series of qualitative and quantitative studies of the initiative. In this report we examine the characteristics and practices of CHSRI schools with strong student achievement. We begin below by discussing previous research on what makes small schools successful. We then provide additional background information on the CHSRI initiative and describe how we conducted our study. Finally, we present our findings and discuss how they may inform the work of small school reformers and researchers.

What Makes Small Schools Successful?

The unofficial motto of the small schools movement may be "Small is not enough."[3] Reformers often caution that reducing school size is no panacea for the challenges facing schools, but is only a lever to help facilitate positive changes in school environment, teaching, and student learning. Both research and anecdotal observations seem to corroborate this warning: for every example of a small school successfully creating a supportive and enriching learning environment for students (e.g., Frederick Douglass Academy in New York City), there are equally dramatic examples of small school experiments (e.g., the recently closed and much discussed Manual High School in Denver, Colorado) that did little to improve the educational experiences of students.[4] Despite such inconsistencies, there has been enough positive evidence to persuade several districts across the country to implement large-scale small school initiatives. As they do so, districts are trying to create schools that not only are small but also that have organizational characteristics that are associated with high student performance. This reality makes it necessary to broaden the discussion beyond the impact of size on school performance and begin to identify the conditions that are necessary to create small schools with strong student outcomes.

While there has been little systematic research addressing this question specifically, a number of researchers and reformers have identified several school practices and characteristics that may help explain why some small schools are more successful than others at bolstering student achievement. First, establishing school environments that provide personalized academic and social support to students may be one key to improved learning. Darling-Hammond et al. observed that successful

small schools create strong relationships between students and teachers as well as structures to support them.[5] Several other studies also found a relationship between personalized school environments and student achievement.[6] In contrast, small schools may see fewer benefits when they do not create these structures to facilitate supportive relationships and contexts.[7]

Developing strong teacher professional communities focused on improving instruction and student learning also may be important for success. Previous studies have shown that teachers in successful small schools are given adequate time to plan together and make productive use of this time by critiquing and improving each other's instructional practices.[8] In addition, successful schools often provide teachers with several opportunities for professional growth and development within the school.[9] Supovitiz and Christman found that when teachers in small learning communities engaged in structured and sustained discussions about instruction, student achievement improved.[10]

Another important aspect of success appears to be school leadership. To meet the demands brought about by school restructuring and the increased workload associated with having a smaller staff, several studies argue that small schools need to distribute leadership and allow teachers to play an active role in decision making and school management.[11] Traditional top-down leadership undermines school morale, trust, and professionalism, and may have adverse affects on student outcomes.[12] Yet without good principal leadership, small schools risk not developing key school structures and supports or having them decline over time.[13] Strong principal leadership also is important for establishing a vision for school improvement and efforts to implement it. In earlier research on CHSRI small schools, we found that principals were crucial catalysts in helping teacher communities engage in structured and sustained collective work on instructional improvement. Without principal leadership in this area, teachers were unlikely to organize these efforts on their own.[14]

The most important element of success, however, may be schools' emphasis on pushing all students towards high academic achievement. Referred to as academic press, this collective focus on rigorous academic work often is cited as the necessary element to move small schools beyond being simply nurturing environments to places where students can develop their full intellectual potential and promise.[15]

While all these factors are believed to be important for the success of both large and small schools, there is little understanding of how they work across these different contexts. Furthermore, there are few studies examining the association of these factors with student outcomes in major small school initiatives like CHSRI. Finally, it is not clear whether these factors can produce strong student outcomes in isolation or if they need to work in combination with one another. And if the latter is the case, which specific combinations of factors should be present in small schools? In this report we attempt to answer these questions by identifying CHSRI small schools with high levels of student achievement given their student populations and

TABLE 1

Performance and Demographic Characteristics of First-Time Freshmen, 2005–06

	CHSRI Schools	All Other High Schools	All Other Non-Selective High Schools
Incoming Eighth-Grade ITBS Reading	230	246	240
Racial Composition Percentage			
African American	85	49	51
Latino	13	38	39
White	2	9	7
Percentage Receiving Special Education Services	23	16	17
Percentage Old for Grade	35	25	28
Percentage with Two or More Moves in Three Years Prior to High School	14	8	9

The national average Iowa Tests of Basic Skills (ITBS) score for an eighth-grader is 250, for a seventh-grader is 239, and for a sixth-grader is 227.

comparing their characteristics to other CHSRI schools with lower levels of achievement.[16]

A Brief Description of the CHSRI Initiative

The CHSRI initiative is a collaborative reform effort between several funders and Chicago Public Schools (CPS). With an initial $12 million grant from the Bill & Melinda Gates Foundation and $6 million in matching funds from local funders, its goal is to create approximately two dozen small high schools across the city.

The initial strategy of the initiative was to close large underperforming high schools and convert them to several small autonomous schools within the same building. This process began in 2002 as CHSRI opened five small high schools on three large high school campuses that were scheduled to phase out over the next three years. At the start of the 2003 academic year, four additional schools were opened on these campuses, and a final set of three opened in 2004.

With a grant of approximately $8 million dollars in 2003, CHSRI expanded its strategy to create new start (not converted) high schools—schools with completely new cohorts of students and teachers. In 2004 the first wave of these new CHSRI schools began with the creation of two schools connected to the Big Picture Schools network. In 2005 two additional new starts were created. And finally, in 2006 an additional seven new start schools were created on two campuses.

Since the inception of the initiative, CHSRI schools served predominately African American

and Latino students, most of whom have low academic achievement and high academic needs. This is especially true of the freshman cohorts in schools opened prior to 2006, the group from which our study's sample is drawn.[17] As illustrated by Table 1, the 2005–06 freshman cohorts from these schools were predominately African American. Their average eighth-grade Iowa Tests of Basic Skills (ITBS) score in reading was 230, approximately two years below grade level. In addition, a little less than one-fourth of these CHSRI students needed special education services, compared to 16 percent in other district high schools. More than one-third of the students had been held back at least a year in elementary school and thus were old for their grade. In sum, CHSRI schools serve students most in need of a high-quality educational experience.

How We Conducted the Study

To identify the characteristics and practices of CHSRI schools with strong student outcomes, we draw on a combination of quantitative and qualitative data in a sample of ten schools. Each school in our sample participated in the Consortium's biannual district-wide survey administered in April and May of 2005. In addition, we conducted principal interviews and one teacher focus group in each school during May and June of 2006. The general strategy for our analysis was to identify schools in our sample with strong student achievement and compare them with other schools in the sample on factors potentially related to student achievement.

Indicator of Student Achievement

We identified schools with strong student achievement using records of first-time freshman grades for the 2005–06 school year. Specifically, we examined schools' average GPAs and on-track (to graduate) rates. Students' unweighted GPA was used for the analysis where four points are given for an A, three for a B, two for a C, one for a D, and none for an F. A school's on-track (to graduate) rate is the proportion of students who have accumulated five credits and have no more than one failing grade in a semester course in a core subject (English, math, science, and social science) by the end of the freshman year.[18]

Some may argue that indicators based on course performance are inappropriate because grades are subjective, easily manipulated by schools, and not as predictive as standardized tests. We contend, however, that grades offer a valid and strong indication of students' achievement. In Chicago there is little evidence of grade inflation in schools. On the contrary, it appears to be rather difficult for students to get A averages. Overall 59 percent of 2002 and 2003 graduates completed school with a 2.5 GPA or less, while only 7 percent graduated with a 3.5 or higher average. Fewer than 20 percent of Latino and African American students graduated with a GPA higher than 3.0. More importantly, these trends do not vary much by school. After controlling for students' background characteristics, differences in GPA and the number of Fs students receive between the highest and lowest performing schools is modest—0.3 grade points and 1.4 Fs respectively. Furthermore, stu-

dents with low incoming test scores do not receive better grades at low performing schools.[19]

In addition, students' performance in courses, independent of test scores, is a strong indicator of student achievement. Allensworth and Easton show that freshmen who are on-track (to graduate) are four times more likely to graduate high school than students off-track, and that on-track status is a stronger predictor of graduation than incoming standardized test scores.[20] In addition, Roderick, Nagaoka, and Allensworth find that grades are crucial for success beyond high school. Specifically, they demonstrate that grades matter more than standardized test scores for college access and are the best predictor of students' likelihood of college graduation.[21] Thus, both grades and on-track status are important indicators of academic achievement and are related to students' overall life chances and opportunities.

Finally, we chose to not use standardized test scores as an indicator of student achievement for several reasons. First, in Chicago it is difficult to determine with confidence which schools have better average standardized tests scores, even after controlling for school demographics. This is because some schools retain relatively more of their low-performing students and have them take standardized tests during their sophomore and junior years. Such schools will incorrectly look worse compared to other schools since their average scores reflect a wider range of students. Even when accurate comparisons of schools' average test scores are available, the frequent lack of rigorous alignment between standardized tests and state learning standards suggests that tests may be poor indicators of the content and quality of classroom instruction.[22] In fact, in schools where more teachers mold their instruction and curriculum to improve test scores, standardized tests may become better indicators of a school's focus on test preparation than their success in fostering authentic student achievement.[23] Given all of the above considerations, we believe that course performance offers a more useful and valid measure of student achievement.

To create an indicator of student achievement, we compared the performance of each school in our sample to the average performance of all high schools in the district serving a similar student population. CHSRI schools in our sample were coded as having strong course performance if both their average GPA and on-track rate were statistically better than the district average.[24] Appendix C provides a complete description of the model and variables we used for this analysis.

Indicators of School Characteristics Potentially Important for Student Achievement

Indicators of school characteristics come from a combination of CCSR surveys and qualitative fieldwork. Teacher and student survey descriptions are based on responses from 3,273 teachers in 52 schools and 15,929 first-time freshmen in 71 schools. Our CHSRI sample draws on 220 teachers and 753 students in ten schools. We constructed survey measures indicating the degree to which teacher leadership, academic press, and student supports exist in schools. Appendix A contains details about the analytic samples, and Appendix

B describes the Rasch and principal components analysis methodology used to create survey measures and factors.

We also draw on fieldwork conducted in all 20 CHSRI schools, but primarily report here on data from our sample of ten CHSRI schools that also have complete student and teacher survey data. In each school we conducted principal interviews and teacher focus groups, talking with a total of 56 school staff across our sample schools. From this data we were able to evaluate both principal leadership and teacher professional communities in schools. See Appendix D for a description of our qualitative analysis.

We coded schools in our sample for whether they were strong in each of these areas of interest. For quantitative indicators this was done by using hierarchical models to identify schools with teacher and student survey responses that were statistically more positive than schools serving similar students.[25] A complete description of the models and variables used can be found in Appendix C. For each qualitative indicator we used specific criteria, based on the concepts we were trying to capture, to identify strong schools. These definitions will be described below in our discussion of each indicator.

The indicator of teacher professional community comes from qualitative data. During our fieldwork we asked principals and teachers to identify the activities they pursued during the year to improve academically. We used their responses to examine whether schools engaged in developmental practices—regular group interactions focused on common instructional issues—to pursue their improvement goals.[26] To do this we coded each improvement activity in each school for whether it involved a developmental component. Activities received this designation if they were not related to any external standardized test preparation activities and met three criteria. First, the improvement activity had to have a focus on a specific and shared instructional issue. Some examples of these activities from our fieldwork included aligning curricula to state learning standards, improving student assessments, implementing differentiated instruction, and developing outcome-based learning goals. Peer classroom observations activities met this criterion if feedback to teachers was based on specific, explicitly shared instructional norms or expectations. Second, the activity had to involve teachers in group work or discussion about the common issue. The group work could occur in teacher meetings or professional development. And finally, the collaborative component of the activity had to be sustained over time, indicated by references to either regular (e.g., once every two weeks) or less frequent meetings, but consistent meetings over a long period of time. Schools with at least one improvement activity that met these requirements were coded as having a strong teacher professional community.

During our fieldwork we also examined the role principals play in improvement efforts. We noted several different tasks principals perform in relation to improvement activities such as, but not limited to: identifying problems to be addressed; developing improvement strategies; coordinat-

ing and participating in improvement work; and monitoring the progress of activities. In addition, we observed that some principals engage in what we call deep principal instructional leadership—or intensive involvement in specific improvement activities marked by the performance of multiple leadership tasks. Principals were coded as exhibiting deep leadership if they performed at least two concrete, long-term or central tasks associated with an instructional improvement activity. For example, one principal wanted to improve the instructional and relational skills of his teachers for meeting the needs of low-income students. After identifying this as an issue to be addressed, he organized a reading group in which all teachers were required to participate. He and the teachers used the group to develop instructional strategies for groups of students in their school. The principal also organized a retreat with the author of the book they read to refine their improvement strategies. After the retreat he worked with teachers in the school to implement what they had developed. In sum, this principal performed several tasks that went beyond transitory involvement and were necessary for the initiation, implementation, and continuation of the activity.

Our indicator of teacher leadership is a survey measure capturing teacher influence in schools. It asks teachers how much influence they have over school policy in several areas such as hiring, school scheduling, budgets, professional development, and instruction. It also asks more generally how involved teachers are in important decision making and if they feel comfortable voicing their concerns.

For our indicator of personalized student supports we created a factor that combines six survey measures. The first measure in the factor, *School-Wide Future Orientation,* asks students how much teachers work to make sure that all students stay and succeed in school as well as help students plan for their future. *Sense of Belonging* asks students to report their feelings of fitting in at school, whether school feels like a family, and the level of their participation in school activities. It also asks whether students have people in their school who care about and help them. *Classroom Personalism* measures whether students' math or English teacher gives them individual assistance with their academic problems. Through the *Student-Teacher Trust* measure, students report whether teachers care about them, keep their promises, try to be fair, listen to students' ideas, and treat students with respect. Our measure of *Teacher Support* asks students if there is at least one teacher who cares about how they are doing, would be willing to help with a personal problem, and would talk with them if they were having problems in class. Finally, *Peer Support for Academic Achievement* measures how much students talk about what they did in class, if they help each other with homework, and if their friends think it is important to attend class.

We use a survey measure of academic press to indicate the degree to which students are challenged academically in their schools. It includes items asking whether teachers expect all students to work hard and the degree to which their work is challenging.

In the final step of our analysis we organized quantitative and qualitative descriptions of each school into a data table to identify combinations of school characteristics that produce strong student achievement. Appendix D details the method used for our analysis. The next section presents the results.

Introduction Endnotes

1 Other cities that have implemented small schools initiatives include New York, San Diego, and Los Angeles. See Allensworth (2005); Ponisciak (2005); Green and Winters (2005); Allensworth (2004); Powell, Farrar, and Cohen (1985) for examples of problems in urban schools.
2 See Lee (2002); Holland (2002); Mitchell (2000) for studies showing small schools having a positive impact and Kahne, Sporte, and de la Torre (2006); Mitchell, et al. (2005); Hess and Cytrynbaum (2002); Wasley et al. (2000) for examples of an inconsistent impact.
3 See Cotton (2001) for a review of the limits of small schools reform.
4 *Insideschools* (2008); Gewertz (2006).
5 Darling-Hammond et al. (2002).
6 Lee et al. (1993); Lee and Smith (1995).
7 Wehlage et al. (1992); Raywid (1990).
8 Fine and Somerville (1998); Ancess (1997); Mohr (2000).
9 Ancess and Ort (1999); Wasley and Lear (2001).
10 Supovitz and Christman (2003).
11 Ancess (1997); Wasley et al. (2000); Mohr (2000).
12 Oxley (1994); Copland and Boatright (2004).
13 Shear et al. (2005).
14 Stevens (2006).
15 Mohr (2000); Wasley et al. (2000).
16 Other factors such as autonomy, accountability, and initial planning process may also be related to success. While there are some differences in these areas across CHSRI schools depending on when they were started, and these differences could shape schools' ability to develop certain organizational characteristics, we do not believe they change how organizational characteristics influence student achievement. Furthermore, the impact of these differences is minimized since CHSRI schools operate under the same set of district guidelines and began with comparable levels of financial and technical support. Finally, any differences in these areas do not appear to be critical to student outcomes as the high performing schools identified in this study come from several different cohorts of CHSRI schools. Thus, we can focus our attention on the relationship between key school level conditions and student achievement.
17 The freshman cohorts of CHSRI schools that opened in 2006 tended to have slightly better test scores and less academic and social needs than other freshman cohorts of the other CHSRI schools. This change may have happened because students from these schools were not drawn from schools already on probation. In addition, these schools had an easier time recruiting a diverse pool of applicants since they did not have to overcome long-standing negative reputations.
18 See Allensworth and Easton (2005) for a more detailed description of the Consortium's on-track indicator.
19 Roderick, Nagaoka, and Allensworth (2006); Allensworth and Easton (2007).
20 Allensworth and Easton (2005).
21 Roderick, Nagaoka, and Allensworth (2006).
22 Rothstein (2004).
23 See Allensworth and Correa (forthcoming) and Nichols and Berliner (2005) for discussion of how pressures to raise test scores negatively impacts instruction in schools.
24 We used residual files from a two-level hierarchical model to identify schools who were better than expected at the $p<.05$.
25 $p < .05$.
26 In our earlier study of professional communities in CHSRI schools (Stevens [2006]), we described two different improvement activities in teacher groups: supportive and developmental practices. Supportive practices are interactions through which teachers exchange information and advice for addressing specific classroom tasks, problems, or concerns. While extremely useful for providing mutual support for performing everyday responsibilities, supportive practices will not necessarily help improve overall instruction in schools because they primarily take place between pairs of teachers and address individual concerns. In contrast, developmental practices involve sustained, collective work on common instructional issues and are thus more likely to lead to more systemic improvements across a group of teachers.

What Matters for Strong Student Outcomes?

The distribution of characteristics and outcomes in our sample suggests that CHSRI schools have been successful at developing the capacity of school staff to work together and contribute to school activities. Yet they have been less successful at consistently strengthening the school experience or course performance of freshman students. Looking across the columns in Table 2 (see page 3), we find that developmental practices, deep principal leadership, and strong teacher influence were the most common school characteristics, with each present in six schools. On the other end of the spectrum, strong student supports and academic press were rarely present: just three schools had strong student supports and no school had strong academic press.

Going down the rows in Table 2 we also see that there was considerable variation in the number of characteristics schools exhibited: three schools were strong in four of the examined areas, one school was strong in three areas, four schools were strong in one or two areas, and two schools were not strong in any of the five areas. Finally, the last column in Table 2 shows that only four out of the ten schools had strong course performance compared to all CPS high schools serving similar students.

Formal analysis of the distribution of characteristics and outcomes finds that there are two combinations of attributes associated with strong course performance. The first, found in three schools, combines developmental practices, deep principal leadership, teacher influence, and strong student supports. The second combination, found in one school, contains three of these characteristics: developmental practices, deep principal leadership, and teacher influence.[1] Notice in Table 2 that two schools contained developmental practices and deep principal leadership, while two other schools had strong teacher influence. Yet unlike the four schools with all three characteristics, none of these four schools produced strong first-year course performance. This suggests that strong principal leadership, developmental practices, and strong teacher influence are not sufficient individually to produce strong course performance; the combination of all three is both sufficient and necessary to do so.

The importance of student supports is not as clear, however. On the one hand, since School 4 was able to produce strong course performance without strong student supports, this factor could be eliminated from our consideration, leaving just the combination of deep principal leadership, develop-

TABLE 2

Presence or Absence of Causal Conditions and Outcomes for CHSRI Schools

	Qualitative Indicators			Quantitative Indicators		Outcome
	Developmental Practices	Deep Principal Leadership	Teacher Influence	Strong Student Supports	Academic Press	Strong Course Performance
School 1	1	1	1	1	0	1
School 2	1	1	1	1	0	1
School 3	1	1	1	1	0	1
School 4	1	1	1	0	0	1
School 5	1	1	0	0	0	0
School 6	1	1	0	0	0	0
School 7	0	0	1	0	0	0
School 8	0	0	1	0	0	0
School 9	0	0	0	0	0	0
School 10	0	0	0	0	0	0

Note: "1" indicates the presence of a condition or outcome; "0" indicates its absence.

mental practices, and teacher influence to explain the presence of the strong course performance in our sample. Yet, three of the four schools with strong course performance also had strong student supports, suggesting that schools with the outcome tend to share this characteristic. Given this strong tendency in our sample and other studies showing the importance of personalized environments for students, we believe it is more likely that strong student supports are an important component of successful schools.

Finally, these findings suggest that a high level of academic press is not necessary for schools to produce strong first-year course performance. As mentioned earlier, strong academic press was completely absent in our sample of schools. Despite its absence, four CHSRI schools had high student achievement compared to other similar high schools.

It is possible, however, that we are unable to capture the relevance of academic press for two reasons. First, the overall between-school variation in our academic press measure is relatively low.[2] If all schools score too similarly on the measure, it might not be "sensitive" enough to identify real differences between them. Second, if the small population of CHSRI schools in our sample is somehow exceptional, we might miss a relationship between academic press and course performance that actually exists in the general population of

high schools. While both of these accounts are plausible, additional analysis does not seem to support them. For instance, earlier research on the CHSRI initiative found statistically more positive differences in reports of academic press by junior students in CHSRI schools compared to juniors in other high schools using the same measure with approximately the same between-school variation (5.0 percent vs. 5.6 percent variation).[3] Thus, the measure can pick up the differences between schools if they exist, and CHSRI schools do seem to be doing a better job at academically challenging some students. In addition, we performed a separate analysis examining the relationship between schools' average academic press and average GPAs and on-track rates across all high schools in CPS. In both cases, no statistically significant relationship exists.[4] In short, neither between-school variation nor sample size seems to explain why academic press is not associated with high levels of student achievement in our findings.

How Do Key Characteristics Work Together?

If developmental practices, deep principal leadership, and teacher influence must all be present in schools with strong student achievement, how might these attributes work together to produce strong outcomes? Discussions with principals and teachers suggest that developmental practices are supported both by deep principal leadership and teacher influence, albeit in different ways. Deep principal leadership acts as a catalyst for initiating and sustaining developmental practices.[5] Yet as we discussed earlier, schools that engage in developmental practices will not necessarily have strong student achievement. Teachers in schools with strong student achievement, however, also described taking an active role in shaping collective improvement work. This influence appears to help create a context in which developmental practices are both meaningful and relevant to teachers' classroom responsibilities.

Teachers' and principals' descriptions of their improvement activities help to illustrate these connections. For example, Paulina High School's efforts to develop grade-level performance expectations for students show how deep principal leadership can foster developmental activities. Paulina High's work to develop grade-level performance expectations began with the principal building on what his teachers learned at an action research workshop sponsored by the CHSRI intermediary organization.[6] The principal, collaborating with this group of teachers, asked each department to resubmit its end-of-year performance goals, differentiating them by grade levels. In addition to helping the school focus more on student learning, the rationale for developing the grade-level goals, according to the principal, was to

> "be very concrete with our school community in terms of our expectations of our school experience at each grade level and guide the decisions we make within the classroom over the course of the year. [We also wanted to have] a tool for us to collaborate as a school community to develop [a] collective vision about what we want for our students."

The principal and group of teachers looked

over each department's submissions, noting possible areas for revision and general patterns. They then shared their observations with the entire school staff. Through this discussion the school began to notice academic skills and outcomes that cut across disciplines. Taking this new information, the principal and a small group of teachers created a general set of grade-level expectations and again shared them with the whole school for feedback. After repeating this process several more times, the principal and the team of teachers eventually developed a working list of grade-level outcomes. As a result of these efforts, teachers in the school had a framework for developing their end-of-year student projects. As this case shows, the principal identified an instructional area he believed needed to be improved. Because he brought the problem to the attention of teachers who were already learning about the topic and organized work around it, teachers in the school engaged in sustained, collective work to address the issue.

While engaging in developmental practices is important, teachers in the four schools with strong student achievement also commented that such work needs to be supported by teacher input. Specifically, they pointed out that it was affirming to share their views and shape improvement activities. Both teachers' substantive contributions and heightened feelings of self-worth made it easier for them to accomplish collective work and make it useful. For example, a teacher at one school described that she and her colleagues were able to meet their curricular improvement goals in part because:

> "We are valued as professional here, so when we have something to say about the [curriculum] map or we think something is not going the right way or it should go a different way, our professional opinion . . . [is] valued. So that makes all the difference in the world in getting that kind of stuff done."

Her colleague added that when teacher input is not respected:

> "[Curriculum mapping] just becomes another thing you have to do on paper instead of a meaningful working document that's going to increase teaching and learning."

An improvement activity at Adams High School provides another example of this input. During December 2004, Adams's principal began working with teachers to develop fall semester final exams. The once-a-week-exam meetings during the month opened the principal's eyes to the fact that there was wide variation in teachers' understanding of how to develop and write quality assessments. To address this, she and the school's teachers spent the second semester working together to create better assessments. While engaged in this work, the principal also had an opportunity to attend an out-of-state workshop on assessments. She recalled being "blown away" by the session and asked the facilitator to come and train her school's staff for two days during the summer on the creation of effective assessments.

After the workshop, the school decided that for the 2005–06 school year they would create a system of interim assessments tied to college readiness standards because "if we are [going to be a] college prep [school], that means ACT

scores count." Teacher teams in English, reading, and math began meeting with school administrators that autumn to understand the specific skills outlined in the college readiness standards and to develop assessments around them. The school eventually created a color-coded charting system to track the percentage of students in each class who were meeting the performance benchmarks. After each assessment, the charts were used in group discussions of students' progress and instructional strategies aimed at boosting learning. Adams High School's assessments are now given four times a year.

Throughout the process of creating this system, teachers in the school had substantial control over what should be included in the assessments, how to tie them to their own curricula, and how to use the collected data to improve students' performance. Their influence was reflected in the encouragement they received from their principal. One teacher described the principal's attitude this way:

> "[The principal says] if you want to do it that way, you do it that way, and then we'll make it happen. She's saying . . . 'Yes I trust you . . . let me know what you think.'"

In sum, developmental practices seem to be supported by both deep principal leadership and teacher influence. The first helps to initiate, encourage, and sustain collective work in schools, while the latter helps make it more meaningful and engaging for teachers. Having both of these supports present in conjunction with developmental practices was associated with strong first-year course performance in CHSRI schools. When only one support, such as deep principal leadership, was present with developmental practices, schools did not produce strong student achievement. This suggests that it may not be enough for teachers to simply engage in developmental practices. Rather, teachers also need to actively shape the work if it is going to impact student course performance.

Endnotes

1 Because our analysis does not privilege presence of conditions over their absence, technically the absence of strong academic press in schools is part of the combination of characteristics associated with strong student course performance. There is however, no theoretical reason to think that the absence of this condition is important for schools' success and therefore we do not consider it to be relevant to our explanation.

2 See Appendix B for the between-school variation of all measures.

3 Kahne, Sporte, and de la Torre (2006).

4 Analysis was performed using a two-level HLM. See Appendix C for model.

5 This is consistent with our earlier finding about the importance of principal leadership for developmental practices in Stevens (2006).

6 Action research projects are a process for teachers to systematically document, reflect upon, and assess selected instructional and learning practices (see Sagor [2000]). Intermediary organizations are non-profit groups that received grants to develop and provide technical assistance to Gates-funded small schools.

Interpretive Summary

Joining the chorus of other small school researchers and reformers, this study finds that reducing school size does not guarantee success; only four out of ten schools in our sample produced strong first-year course performance compared to other schools serving similar students. Nor does small size ensure schools will be able to make deep changes to their environment. Several of the schools we examined did not have strong teacher professional communities and most did not provide better personalized academic and social supports to their students. These findings remind us that there is an important difference between changing the collegiality and affective character found in schools, which small size seems to improve, and transforming how teachers work together and with their students. The former requires only that relationships become more familiar, while the latter requires schools to create new routines for monitoring and attending to the development of teachers and students.

When small schools are able to change how adults work together, however, student achievement improves. Every school with a strong professional community, deep principal leadership, and strong teacher influence was able to improve students' first-year course performance. This finding has several important implications. First, it suggests that teachers working collectively to improve instruction may be one of the most important school conditions for improving first-year performance in small schools. Collective improvement work on common instructional issues makes it more likely to influence classroom practices across larger groups of teachers. In addition, others have found that high levels of professional community are associated with authentic pedagogy.[1] Thus, schools that engage in professional community activities, such as the developmental practices described in this report, would be more likely to raise student achievement and improve instruction.

This collective work, however, requires robust school leadership. Deep principal leadership was crucial for monitoring, organizing, and sustaining collective work in our sample of schools, while teacher leadership helped to make collective work more relevant for the staff engaged in it. Both forms of leadership were necessary for schools to have strong student achievement. Reforming leadership in small schools, then, is not as simple as replacing principal-controlled instructional leadership with a primarily teacher-controlled system. Rather, leadership tasks need to be stretched across people, roles,

and situations in ways that become more than just the sum of individual contributions.[2] And it requires balancing individual expertise with the constraints imposed by official roles. Finding such a balance can make leadership more sustainable and lead to enduring improvements in instruction and learning.[3]

Providing students with personalized academic and social supports also appears to be important for student achievement, as three of the four schools with this characteristic had strong student course performance. Yet, one school was able to produce strong outcomes without it. This suggests that while personalized student supports may facilitate improvement, they may not be essential for schools to raise student achievement. Furthermore, efforts to create more personalized environments may not lead to improvements in cases where leadership and professional community are absent.

Contrary to what we expected to find, strong first-year course performance was not associated with high levels of academic press. In fact, first-year students in all of the CHSRI schools reported only average levels of academic press. Additional comparisons with junior CHSRI students as well as an analysis of academic press' unique relationship with student outcomes showed that our findings are not the result of obvious methodological issues. Instead, our findings may be due to the fact that the transition to high school is new and challenging for most students and, therefore, freshmen report similar levels of difficulty and demands. Or in high performing schools, students could be receiving rigorous instruction but not feel pressed. In later years, however, differences in reports of press might emerge and have a greater impact on students' course performance. This explanation is partially supported by our earlier work showing that junior CHSRI students, but not freshmen, reported higher levels of academic press than similar students in similar schools.[4] Another explanation could be that academic press may have more influence on other outcomes, such as dropout rates, than it does for course performance. While we would be hard-pressed to say that academic press is not important, this study finds little evidence demonstrating its influence on school-level outcomes during the freshman year. It does suggest, however, that more research is needed on how first-year students perceive and respond to academic press.

Finally, this study confirms earlier Consortium work that shows improving student achievement requires schools to simultaneously develop multiple areas of instructional supports.[5] Strength in just one or two areas is not enough to produce significant improvements. In this case, a combination of strong professional community, deep principal leadership, and teacher influence was necessary for schools to produce high student achievement. Developing multiple areas of schools' organizational characteristics will require intentional and concerted efforts on the part of school leaders and small school reformers. If such efforts lead to improved student achievement, it will be time well spent.

Endnotes

1 Louis, Kruse, and Marks (1996).
2 Spillane, Halverson, and Diamond (2004).
3 Hargreaves and Fink (2003).
4 Kahne, Sporte, de la Torre (2006).
5 Sebring et al. (2006).

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Appendix A: Description of the Sample

Teacher and Student Surveys

Data used in our survey analysis were taken from our 2005 biannual survey. Students, teachers, and principals in all 103 non-alternative high schools were invited to participate in our survey. Approximately 4,150 teachers in 87 schools responded, as did approximately 35,600 students in grades 9 and 10, and 10,600 students in grade 11. Only schools with at least a 50 percent survey response rate were included in our sample. We also did not include eight CPS achievement academies. Achievement academies are separate schools within a larger high school for students who did not meet the promotion criteria to attend a high school and are too old to remain in elementary school. Since their population, curriculum, and supports are different than what first-time freshmen experience, they are not part of our sample.

TABLE A1

Consortium on Chicago School Research Overall Survey Response Rates

	Number of Surveyed Schools	Number of Responding Schools	Number of Surveyed Individuals	Number of Responding Individuals	Surveyed Schools: Individual Response Rate	Responding Schools: Individual Response Rate
Teacher Survey	103	87	7,635	4,142	54%	59%
Ninth- and Tenth-Grade Student Survey	101	87	60,615	35,608	59%	64%

TABLE A2

Analytic Sample*

	Number of Schools with Response Rates of 50% or More		Number of Individuals in These Schools That Responded	
	CHSRI Sample	Other Schools	CHSRI Sample	Other Schools
Teacher Survey	10	42	220	3,237
First-Time Ninth-Grade Student Survey	10	61	753	15,544

** Number of individuals in the sample varied slightly depending on the measure being analyzed. See Appendix B.*

Student Outcomes

We analyzed outcome data from all CPS high schools except alternative schools and the achievement academies described above.

TABLE A3

Students and Schools Used in Analysis of Raw GPA and On-Track (to Graduate) Rates

	Number of Students		Number of Schools	
	CHSRI Sample	Other Schools	CHSRI Sample	Other Schools
2005–06	1,419	25,954	10	67

Appendix B: Survey Measures and Factors

We combined multiple items from our teacher and student surveys into measures using Rasch analysis.[1] Each measure is on a continuous, linear scale that can be used for statistical procedures. Survey items are used to define measures based on the relative probability of a respondent choosing each category on each item. A fit statistic is used to omit or include items into measures. The internal consistency of scale items is also evaluated using the person reliability statistic. Individuals are then placed on measure scales based on their particular responses to items in the measure. Placement on measure indicates the "amount" of a characteristic or skill that an individual possesses.

For our indicator of personalized student supports, we combined six measures into a single factor using principal component analysis. This technique examines the relationship between several observed variables to identify underlying factors that can be represented with a smaller number of variables.

TABLE B1

Teacher and Student Measures

Measure	N	Individual Reliability	Between-School Reliability	Between-School Variation
Teacher Influence	3,258	0.84	0.89	21.9%
Description: Measures the extent of teachers' involvement in school decision making. It assesses teachers' influence on the selection of instructional materials, setting of school policy, in-service program planning, spending of discretionary funds, and hiring of professional staff.				
Academic Press	12,481	0.76	0.75	5.0%
Description: Students' views of their teachers' efforts to push students to higher levels of academic performance. Students also report on the degree to which they find their classes to be challenging.				
Student Support Factor	12,453	0.80*	0.89	9.9%
Description: A factor combining the following six measures of supports students receive: school-wide future orientation, sense of belonging, peer support for academic achievement, classroom personalism, student-teacher trust, and teacher support.				
* Cronbach Alpha				

Appendix B Endnote

1 Wright and Masters (1987).

Appendix C: Models Used in This Report

Teacher Measure/Teacher Influence

We used a three-level hierarchal liner model (HLM) to examine whether teachers at CHSRI schools had higher than expected levels of teacher influence, as measured by our 2005 teacher survey.[1] The first level adjusted for measurement error produced by the Rasch analysis. At level two we modeled individual teachers' "real" scores by controlling for the following background characteristics: gender, race, years of experience, level of education, whether the respondent entered the profession through an alternative process, and whether the respondent was a classroom teacher. We fixed the slopes for these variables at level three so that relationship between each variable and the outcome measure was held constant. The intercept in the level two equation can be interpreted as the school mean adjusted for individual background characteristics. At level three we adjusted for differences in the following school characteristics: incoming eighth-grade achievement level of the student body, adjusted for current grade; aggregate socioeconomic status; and whether the school was at least 70 percent African American. All variables were grand mean centered.

Using the residual file produced by the HLM analysis, we divided the empirical Bayes residual for the level two intercept by the square root of the posterior variance. If the result was greater than 1.96, the school was flagged as having strong teacher influence.

Level One

$$\frac{Measure_{jk}}{s_{jk}} = \pi_{jk}\frac{1}{s_{jk}} + e_{jk}$$

where $e_{jk} \sim N(0,1)$, s_{jk} is the standard error estimated from the Rasch analysis for teacher *j* in school *k* and π_{jk} is the teacher's "true score."

Level Two

$$\pi_{jk} = \beta_{0k} + \beta_{1k}(\text{Female})_{jk} + \beta_{2k}(\text{Latino})_{jk} + \beta_{3k}(\text{White})_{jk} + \beta_{4k}(\text{Asian})_{jk} + \beta_{5k}(\text{Native American})_{jk} + \beta_{6k}(\text{Other})_{jk} + \beta_{7k}(\text{Classroom Teacher})_{jk} + \beta_{8k}(\text{Bachelor's Degree})_{jk} + \beta_{9k}(\text{Doctorate Degree})_{jk} + \beta_{10k}(\text{3 or less years teaching})_{jk} + \beta_{11k}(\text{4 to 10 years teaching})_{jk} + \beta_{12k}(\text{Alternative Certification})_{jk} + \beta_{13k}(\text{No Gender Data})_{jk} + \beta_{14k}(\text{No Race Data})_{jk} + \beta_{15k}(\text{No Data on Experience})_{jk} + \beta_{16k}(\text{No Data on Education Degree})_{jk} + \beta_{17k}(\text{No Classroom Teacher Information})_{jk} + \beta_{18k}(\text{No Alternative Certification Information})_{jk} + r_{jk}$$

A description of these variables can be found in Table C1.

Level Three

$\beta_{0k} = \gamma_{00} + \gamma_{01}$ (Mean Eighth-Grade Achievement)$_k + \gamma_{02}$ (Mean Concentration of Poverty)$_k + \gamma_{03}$ (70% or more African American)$_k + u_k$

$\beta_{pk} = \gamma_{p0}$, for p = 1 to 18

A description of these variables can be found in Table C2.

Student Measures—Personalized Student Supports, Academic Press

To examine whether students in CHSRI schools experience better-than-expected responses on our personalized student supports factor we used a two-level hierarchical model. At level one we adjusted for the following individual student background characteristics: gender, race, socioeconomic status, prior academic achievement as measured on the eighth-grade Iowa Tests of Basic Skills (ITBS) reading test, whether a student was receiving special education services, and whether a student was old for grade. All slopes were held constant across schools. At level two we adjusted for the same school characteristics as we did in our teacher analysis of teacher influence. All variables were grand mean centered.

For academic press, we used a three level model. Level one adjusted for measurement error in each person-measure. In level two we controlled for the same set of student characteristics described in our model of personalized student supports and in level three we adjusted for the same school-level characteristics discussed in the previous models.

We again used residual files from our HLM analysis to calculate whether schools were better than expected on each measure. Schools were identified as having strong personalized student supports or academic press if the result of dividing its empirical Bayes residual by the square root of the posterior variance was greater than 1.96.

Student Supports

Level One

$Y_{jk} = \beta_{0k} + \beta_{1k}$ (Female)$_{jk} + \beta_{2k}$ (Latino)$_{jk} + \beta_{3k}$ (White)$_{jk} + \beta_{4k}$ (Asian)$_{jk} + \beta_{5k}$ (Native American)$_{jk} + \beta_{6k}$ (Concentration of Poverty)$_{jk} + \beta_{7k}$ (Special Education)$_{jk} + \beta_{8k}$ (Eighth-Grade Achievement Reading)$_{jk} + \beta_{9k}$ (Months Old Began High School)$_{jk} + \beta_{10k}$ (No Eighth-Grade Score)$_{jk} + \beta_{11k}$ (No Economic Data)$_{jk} + r_{jk}$

A description of these variables can be found in Table C1.

Level Two

$\beta_{0k} = \gamma_{00} + \gamma_{01}$ (Mean Eighth-Grade Achievement)$_k$ + γ_{02} (Mean Concentration of Poverty)$_k$ + γ_{03} (70% or more African American)$_k$ + u_k

$\beta_{pk} = \gamma_{p0}$, for p = 1 to 10

Academic Press

Level One

$$\frac{Measure_{jk}}{s_{jk}} = \pi_{jk}\frac{1}{s_{jk}} + e_{jk}$$

where $e_{jk} \sim N(0,1)$, s_{jk} is the standard error estimated for the Rasch analysis for student *j* in school *k* and π_{jk} is the student's "true score."

Level Two

$$\pi_{jk} = \beta_{0k} + \sum_{p=1}^{10} \beta_{pk}X_{pjk} + r_{jk}$$

where $\sum_{p=1}^{10} \beta_{pk}X_{pjk}$ represents the ten variables and coefficients from the level one variables in the student supports model.

Level Three

$\beta_{0k} = \gamma_{00} + \gamma_{01}$ (Mean Eighth-Grade Achievement)$_k$ + γ_{02} (Mean Concentration of Poverty)$_k$ + γ_{03} (70% or more African American)$_k$ + u_k

$\beta_{pk} = \gamma_{p0}$, for p = 1 to 10

Student Outcomes—Residuals of Average GPA and On-Track (to Graduate) Rates; Relationship between Academic Press and Student Outcomes

To identify schools with better-than-expected average GPAs and on-track (to graduate) rates, we used two-level hierarchical models. At level one we controlled for gender, race, socioeconomic status, prior academic achievement as measured on the eighth-grade Iowa Tests of Basic Skills (ITBS) reading test, whether a student was receiving special education services, and whether a student was old for grade. All slopes were held constant across schools.

We adjusted for school characteristics by controlling for the incoming eighth-grade achievement level of the student body, adjusted for current grade; aggregate socioeconomic status; and whether the school was at least 70 percent African American.

As with our other models, we used residual files from our HLM analysis to calculate whether schools were better than expected on each outcome. Schools were identified as having strong average GPAs and on-track (to graduate) rates if the results of dividing empirical Bayes residuals by the square root of the posterior variance were greater than 1.96.

To examine the relationship between school-level academic press and average GPA and on-track (to graduate) rates, we used a two-level hierarchical model that controlled for student-level characteristics at level one. All slopes were held constant across schools. At level two we included a variable for schools' average reports of academic press. We adjusted for school characteristics by controlling for the incoming eighth-grade achievement level of the student body, adjusted for current grade; aggregate socioeconomic status; and whether the school was at least 70 percent African American.

Average GPA and On-Track (to Graduate) Residuals

Level One

$$\eta_{ij} = \beta_{0k} + \beta_{1k}\,(\text{Female})_{jk} + \beta_{2k}\,(\text{Latino})_{jk} + \beta_{3k}\,(\text{White})_{jk} + \beta_{4k}\,(\text{Asian})_{jk} + \beta_{5k}\,(\text{Native American})_{jk} + \beta_{6k}\,(\text{Concentration of Poverty})_{jk} + \beta_{7k}\,(\text{Special Education})_{jk} + \beta_{8k}\,(\text{Eighth-Grade Achievement Reading})_{jk} + \beta_{9k}\,(\text{Months Old Began High School})_{jk} + \beta_{10k}\,(\text{No Eighth-Grade Score})_{jk} + \beta_{11k}\,(\text{No Economic Data})_{jk} + r_{jk}$$

Level Two

$$\beta_{0k} = \gamma_{00} + \gamma_{01}\,(\text{Mean Eighth-Grade Achievement})_{k} + \gamma_{02}\,(\text{Mean Concentration of Poverty})_{k} + \gamma_{03}\,(70\%\text{ or more African American})_{k} + u_{k}$$

$$\beta_{pk} = \gamma_{p0}\text{, for p = 1 to 11}$$

For On-Track

$$\gamma_{ij} \mid \varphi_{ij} \sim \beta(1, \varphi_{ij}) \text{ and } \eta_{ij} = \log\,[1 - \varphi_{ij}]$$

For GPA

$$\eta_{ij} = \text{GPA}_{ij}$$

Relationship between Academic Press and Student Outcomes:

Level Two

$$\pi_{jk} = \beta_{0k} + \sum_{p=1}^{11} \beta_{pk} X_{pjk} + r_{jk},$$

where $+ \sum_{p=1}^{11} \beta_{pk} X_{pjk}$ represents the eleven variables and coefficients from the level one variables in the outcomes residuals model.

Level Two

$$\beta_{0k} = \gamma_{00} + \gamma_{01} \text{ (Mean Academic Press)} + \gamma_{01} \text{ (Mean Eighth-Grade Achievement)}_k + \gamma_{02} \text{ (Mean Concentration of Poverty)}_k + \gamma_{03} \text{ (70\% or more African American)}_k + u_k$$

$$\beta_{pk} = \gamma_{p0}, \text{ for p = 1 to 11.}$$

For On-Track

$$\gamma_{ij} \mid \varphi_{ij} \sim \beta(1, \varphi_{ij}) \text{ and } \eta_{ij} = \log \left[\frac{\varphi_{ij}}{1 - \varphi_{ij}}\right]$$

For GPA

$$\eta_{ij} = GPA_{ij}$$

Appendix C Endnote

1 Raudenbush and Bryk (2002).

Description of the Variables Used in Models

TABLE C1

Individual-Level Variables Used in Analyses

Where Used	Description
Teacher Survey Measure Analysis	**Gender** was indicated by a dummy variable. **Race/Ethnicity** was indicated by a set of dummy variables. Categories included "white, non-Hispanic," "Hispanic," "American Indian," "Asian," and "other" (which combined "biracial/multi-ethnic" and "other"). **Classroom Teachers** were indicated by a dummy variable, distinguishing teachers who did not have a specific classroom responsibility from those who did. **Education Level** was indicated by a set of dummy variables. Categories included "Bachelor's degree," "Master's degree" (which combined "Master's degree" with "Master's degree plus 15 credits or more"), and "Doctorate." **Teaching Experience** was indicated by a set of dummy variables. The omitted category was teachers who indicated they had 11 to 15 or more than 15 years teaching experience. **Entering Teaching through an Alternative Certification Program** was indicated by a dummy variable, distinguishing such teachers from those who entered the profession through other traditional programs. **Missing Values** were imputed at the sample mean, and a dummy variable was assigned.
All Analyses of Student Surveys and Outcomes	**Gender** was indicated by a dummy variable. **Race/Ethnicity** was indicated by a set of dummy variables. Categories included "white, non-Hispanic," "Hispanic," "American Indian," and "Asian." **Socioeconomic Status** was based on a measure of Concentration of Poverty. This variable is derived from the 2000 U.S. Census information on the census block group in which students lived. Students' home addresses were linked to a particular block group within the city, which could then be linked to census data on the economic conditions of the student's neighborhood. Two indicators were used to construct the variable: (1) log of the percentage of families above the poverty line, and (2) log of the percentage of men employed in the block group. **Receiving Special Education Services** was based on administrative records. **Student's Elementary Achievement** was based on student reading scores on the Iowa Tests of Basic Skills (ITBS) taken in eighth grade. The analyses of student outcomes included linear and quadratic terms for this variable. **Months Old Began High School** gives the number of months older than 14 years and eight months that a student was as of September 1 of the academic year. Students older than this age should have started high school with the previous cohort if they were to follow school-system guidelines. **Missing Values.** If students were missing values on socioeconomic status or their eighth-grade achievement, they were given values at the sample mean and assigned a dummy variable.

TABLE C2

School-Level Variables Used in Analyses

Where Used	Description
All Analyses	**School-Level Achievement** was computed by averaging the eighth-grade ITBS reading scores of all current members of a school's student body, adjusting for current grade level. The analyses of student outcomes included linear and quadratic terms for this variable. **School-Level Socioeconomic Status.** A description of how this variable was created at the individual level can be found in Table C1. The school-level indicator was an average of the concentration of poverty of all students in the school based on the census block in which each lived. **Racial Composition of the School.** A dummy variable was included for schools with a student body that was at least 70 percent African American.

Appendix D: Qualitative Methodology

The qualitative data were first organized according to several categories of research questions including, but not limited to, academic improvement activities pursued over the course of the year, principal and teachers' role in these activities, and the specific tasks each improvement activity involved. We then used a process of open coding to generate several analytic and descriptive themes. Once themes relevant to the questions pursued in this report were identified, we engaged in an iterative process of focused coding where themes were further elaborated and more abstract concepts identified.[1] We then put data into cross-case displays to explore possible patterns and variations across schools.[2]

To identify school characteristics that produce strong student achievement, we used qualitative comparative analysis (QCA), which is especially suited to examining data sets with a small to medium number of cases.[3] For each case in our sample, we identified whether it exhibited the outcome (strong course performance) and each causal condition (school characteristics). We then constructed a truth-table, or data matrix, with every possible combination of causal conditions. Using Boolean algebra, we reduced the table to identify combinations of factors leading to our outcome of interest.

Rather than identifying the net effects of variables, QCA is used to explore the ways in which specified conditions combine with one another and work together to produce particular outcomes or events. It also allows for the possibility that there are multiple paths to outcomes of interest. Yet, it simplifies analysis by eliminating irrelevant factors. When two combinations leading to an outcome are the same except for one condition, that condition is considered irrelevant and can be dropped for the analysis. This allows the two combinations to be combined into one, simplifying the analysis.

Appendix D Endnotes

1 Emerson, Fretz, and Shaw (1995).
2 Miles and Huberman (1994).
3 Ragin (1987).

About the Author

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W. David Stevens is a Senior Research Analyst for the Consortium on Chicago School Research at the University of Chicago (CCSR). His research focuses on high school reform and instructional development. He was the lead author on an earlier CHSRI report entitled *Professional communities and instructional improvement practices: A study of small high schools in Chicago.* He recently began a three-year mixed-methods study of the transition to high school, which will follow a cohort of students from eighth grade into their second year of high school. This study looks at the ways in which students perceive the challenges of high school, the school practices that can foster successful freshman-year performance, and those that can hinder students. Stevens holds a Ph.D. in Sociology from Northwestern University.

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The Consortium on Chicago School Research (CCSR) at the University of Chicago conducts research of high technical quality that can inform and assess policy and practice in the Chicago Public Schools. We seek to expand communication among researchers, policy makers, and practitioners as we support the search for solutions to the problems of school reform. CCSR encourages the use of research in policy action and improvement of practice, but does not argue for particular policies or programs. Rather, we help to build capacity for school reform by identifying what matters for student success and school improvement, creating critical indicators to chart progress, and conducting theory-driven evaluation to identify how programs and policies are working.

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