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Impacts of the Co-nect School Reform Design on Classroom Instruction, School Climate, and Student Achievement in Inner-City Schools

Steven M. Ross and Deborah L. Lowther
The Center for Research in Educational Policy
The University of Memphis

This study evaluated the Co-nect school reform design in 5 inner-city schools relative to a matched comparison sample of 4 schools in the same district. Schools in each group were categorized into a lower- or middle-socioeconomic status (SES) subgroup based on the percentage of students qualifying for free or reduced-price lunch, percent minority enrollment, and student mobility rate. Co-nect schools relative to comparison schools demonstrated more positive outcomes on (a) school climate on multiple dimensions; (b) teacher commitment, satisfaction, and buy-in; (c) teacher usage of learner-centered teaching strategies (e.g., projects, teacher coaching); and (d) student usage of technology as a learning tool. On most measures, these effects were more evident in the schools serving lower-SES. Results on the state-mandated standardized achievement test, using both percentile communities and value-added scores, showed a mixed pattern of success, with 3 Co-nect schools demonstrating more positive progress and 2 demonstrating less positive progress relative to comparison schools and state norms. Interpretations of the achievement results and of Co-nect impacts overall are made relative to implementation issues and school characteristics.

Spurred by the creation of the Comprehensive School Reform Demonstration Program (CSRDP) by Congress in 1998, increasing numbers of schools each year are dramatically changing the way they operate by implementing whole-school reforms. The legislation supporting the CSRDP program authorized the expenditure

Requests for reprints should be sent to Steven M. Ross, The Center for Research in Educational Policy, The University of Memphis, 325 Browning Hall, Memphis, TN 38152-3340. E-mail: smross@memphis.edu

of \$145 million for individual schools to receive upwards of \$50,000 per year for 3 years (Hatch, 2001). The expectation is that these funds will be used to implement "research-based" designs, with priority given to schools that serve disadvantaged student populations.

Support for using "whole-school" reforms as the framework for positive change evolved slowly but steadily over the past two decades. In 1983, the publication of *A Nation at Risk* (National Commission of Excellence in Education, 1983) spurred local initiatives and soon after a national framework for establishing school reform programs (Stringfield, Datnow, Herman, & Berkeley, 1997). In 1989, Goals 2000 emerged in the Education Summit, when President George Bush and the 50 governors agreed to establish national education goals for American schools. A major lesson learned from both Goals 2000 and Title I (formerly Chapter 1) experiences (Puma et al., 1997) was that reforms done piecemeal, one isolated program at a time, were not likely to bring about positive change. An alternative approach was broadly outlined by the Nobel Prize winning physicist Kenneth Wilson, who called for the evolution of whole-school reform models that can be developed, evaluated, altered, and transferred to other schools (Wilson & Davis, 1994). That logic became the cornerstone of the development of several whole-school design projects, such as the New American Schools (NAS) designs (Kearns & Anderson, 1996).

Today, over 300 different designs are being implemented in CSRD-funded schools. The majority (about 70%) are nationally available (i.e., externally developed) models as opposed to designs developed locally by school districts or individual schools. Based on comprehensive school change studies of the 20th century (review by Nunnery, 1998) as well as numerous mixed-method studies completed in the last 5 years (see Datnow & Stringfield, 2000), the typical school seems likely to experience greater success with an externally developed model. Such designs offer the advantage of coordinated comprehensive components, documented curriculum strategies and materials, and ongoing external support in such areas as professional development, governance structures, resource allocation, and parent and community involvement.

Faced with the costs and uncertainties of embarking on comprehensive school reform, school districts and individual schools are vitally concerned with the effectiveness of alternative models for improving teaching and learning. In the *No Child Left Behind* legislation, President George W. Bush (2001) stressed in the explanation of his educational goals the need to hold state and individual schools accountable for improving academic achievement. The implications for future policies are clear: Regardless of how good CSR designs "feel" to teachers and administrators, and no matter how great their potential to better educational conditions, they will need to produce measurable results to be sanctioned at federal, state, and district levels.

Unfortunately, limited evidence of design effects exists from well-designed studies. In reviewing the evidence for 24 of the most widely used CSR designs, Herman (1999) rated the research support for raising student achievement as

"strong" for only three of them. The vast majority was rated as having only "marginal" or at best "promising" evidence. The potential of well-implemented externally developed designs to improve achievement nevertheless seems strong. A recent longitudinal study in Memphis by Ross and associates (Ross, Alberg, et al., 2000; Ross et al., 2001) compared student achievement on the Comprehensive Test of Basic Skills-5 (CTBS-5) in 56 elementary schools that adopted externally developed reform designs to 23 matched comparison schools and 839 schools in the state. Results showed that prior to the implementation of the school reforms, the restructuring schools were lower performing than were comparison and other schools. After 2 years of implementation, student achievement gains at restructuring schools were significantly higher than at the comparison schools. A limitation of that study, however, was that potentially influential process and implementation variables that might help to explain achievement effects were not examined.

Merely adopting and implementing a CSR design does not naturally lead to improved achievement (Datnow & Stringfield, 2000). Rather, primary causative factors would appear to be positive changes in school organization (Stringfield, 1998), climate, and classroom instruction (Fullan, 2000). Yet historically, reform movements have had limited impact on changing school administrative structures and classroom practices (Cuban, 1993). Can externally developed designs overcome these barriers to promote and sustain effective reform? The answer can be best determined, it would seem, through multisite replicated studies (Slavin, 1997) examining individual designs. Accordingly, our focus is determining impacts on multiple outcome variables of one particular design, Co-nect, as employed in multiple schools in a large urban school district. Co-nect is one of nine CSR designs sponsored by NAS, a private, nonprofit corporation established in 1991 to develop, promote, and support replicable and effective educational reform programs (Stringfield, Ross, & Smith, 1996). In the 2000-2001 school year, Co-nect was being implemented in approximately 200 schools across the nation, with significant expansion expected in future years. Descriptions of the primary elements of Co-nect can be found on their website¹ as well as in publications such as Stringfield et al. (1996) and Herman (1999). These elements, in brief, stress improvement of the school organization, a full-time site director to work with Co-nect schools in a district, project-based learning, extensive technology use and integration with the curriculum, substantial professional development and technical assistance, family and community involvement, and continual and thorough monitoring of student progress and performance. A more detailed description is provided in the section to follow.

¹The Co-nect website address is <http://www.co-nect.org>.

In this study, we examined five Co-nect schools in an inner-city school district (in Memphis, TN) on process and outcome measures consisting of the following: (a) school climate, (b) teaching methods, (c) teacher buy-in, (d) level of design implementation, and (e) student achievement on state-mandated tests. Importantly, with regard to the validity and generalizability of the results, the five schools varied in implementation year and characteristics of the student populations served, and were matched in socioeconomic groupings to comparison schools having similar characteristics. The primary research questions addressed were as follows:

1. How do Co-nect schools compare to similar schools in their use of varied instructional strategies in general and of those having greater (e.g., project-based learning) or lesser (e.g., direct instruction) design emphasis in particular?
2. How do Co-nect schools compare to similar schools in their classroom technology resources, structure and allocation of resources, and uses of technology to support student learning?
3. How do Co-nect schools compare to similar schools in school climate?
4. What are teachers' and principals' reactions to the Co-nect implementation in the areas of professional development, buy-in, resources, district support, and effects on the school and students?
5. How do the Co-nect schools perform in achievement relative to similar schools and other schools in the district?

METHOD

Program Description

The Co-nect model was established in 1992. As of Spring 2001, the model operated in over 200 schools, 60 districts, and 30 states (Hausman, 2001). This model has the distinction of being 1 of 10 nationally recognized comprehensive school reform models that has been endorsed by NAS. To receive this endorsement, Co-nect had to be research-based and provide documented results that show improved student achievement (NAS, 2001).

As a national, design-based assistance provider, Co-nect works with schools to implement an individualized, systemic whole-school reform effort that is primarily focused on improved student performance through the restructuring of educational environments. This involves providing comprehensive onsite, offsite, and online professional development and curriculum resources; structured collaboration with other Co-nect educators; and one-on-one support from a team of education professionals. These combined efforts are focused toward organizational restructuring, building community relations and support, and classroom-level changes.

With regard to teaching and learning, the Co-nect design promotes a standards-based approach that actively engages students in project-based learning that is interdisciplinary and based on authentic "real-world" problems. Each project requires students to utilize higher order thinking, the application of technology, and collaboration to achieve success.

The overall structure of the Co-nect model is best demonstrated in the five benchmarks adopted by the design team:

1. Shared accountability for results: The entire school community holds itself accountable for ensuring that all students perform at the highest possible level.
2. Project-based learning—Teaching for Understanding and Accomplishment: All students are regularly involved in projects and other activities that ask hard questions, involve the application of academic knowledge to real problems, produce deep understanding, and lead to authentic, high-quality work. Many activities generate and depend on multiple, two-way partnerships with parents, businesses, and other outside organizations.
3. Comprehensive Assessment for Continuous Improvement: Assessment is standards-based and employs multiple measures of student achievement. Reporting of results is informative, timely, and interactive. Results are used to guide continuous improvement in teaching and learning.
4. Team-Based School Organization: Teachers are organized in small learning communities or clusters with ample time for planning and reflection. Student grouping is flexible and purposeful, designed to keep students and teachers together for more than 1 year. An instructional leadership team (with guidance from the principal and help from community allies) provides overall leadership and support for continuous improvement within the school.
5. Sensible Use of Technology: All members of the school community have good access to modern technologies. Technology is fully integrated into the curriculum, leading to high-quality teaching and learning. Technology expertise is distributed throughout the school community.

Participating Schools

Relevant demographic data for the Co-nect schools and the matched Comparison schools are listed in Table 1. The table includes, in the last column, the 1995 mean percentile score for the school across five subjects averaged on the state-mandated standardized achievement test. The Spring 1995 mean was selected as the most recently administered test that preceded design implementation at all nine schools. A detailed description of the state assessment and its associated subtests and performance indices is provided in a later section. Of the five Co-nect schools, two (Cnet-1 and Cnet-2) were classified as middle in so-

TABLE 1
Co-nect (Cnct) Schools and the Matched Comparison (Comp) Schools

Schools	Beginning Year	Group	Enrollment	% Poverty	% Minority	Pre-Reform Percentile ^a
Cnct-1	1995	Middle-SES	750	40	45	49.5
Cnct-2	1995	Middle-SES	624	39	55	53.2
Cnct-3	1995	Low-SES	801	94	99	22.3
Cnct-4	1997	Low-SES	328	51	93	61.0
Cnct-5	1997	Low-SES	797	86	99	22.3
Comp-1	NA	Middle-SES	812	33	85	50.1
Comp-2	NA	Middle-SES	568	27	85	70.8
Comp-3	NA	Low-SES	945	93	85	24.8
Comp-4	NA	Low-SES	769	90	85	31.4

^aFor purposes of consistency, the 1995 mean percentile for all subjects averaged was used for all schools.

ocioeconomic status (SES) and three (Cnct-3, Cnct-4, and Cnct-5) as lower-SES on the basis of the percentage of students qualifying for free or reduced-price lunch, percent minority enrollment, and student mobility rate. Note that these designations are relative, because even at the middle-SES schools, as many as 40% of the students qualified for free or reduced-price lunch (compared to a median of 90% at the lower-SES level). The comparison schools were Comp-1 and Comp-2 in the middle-SES group (median free-reduced = 30%), and Comp-3 and Comp-4 in the lower-SES group (median free-reduced = 92%). Three of the Co-nect schools (Cnct-1, Cnct-2, and Cnct-4) are magnet schools in the school district. Cnct-1 and Cnct-2 were directly matched to Comp-1 and Comp-2, also magnet schools, on the basis of demographic comparability. In addition, at the lower-SES level, Cnct-3 and Cnct-5 were similarly matched to Comp-3 and Comp-4.

Given the school district's mandate in 1998–1999 that all schools adopt a "restructuring" model, the comparison schools also shared Co-nect schools' involvement with district and site-based initiatives in educational reform. Alternative models selected by the comparisons were Multiple Intelligences (Comp-1 and Comp-2), Voices of Love and Freedom (Comp-3), and Accelerated Schools (Comp-4). The difference relative to the Co-nect sample was the latter schools were in very early phases of implementation and, in the case of those using Multiple Intelligences and Voices of Love and Freedom, less directed toward making whole-school changes. Thus, the comparison sample was expected to be more reflective of traditional practices or school-wide programs not yet substantively influenced by an externally developed CSR design.

Instrumentations

Data sources consisted of classroom observations, school climate, teacher questionnaires, teacher focus groups, principal interviews, and achievement analysis. Measures for each are described in the following.

School Observation Measure (SOM[®]). The SOM was developed to determine the extent to which different common and alternative teaching practices are used throughout an entire school (Ross, Smith, & Alberg, 1999). The standard SOM procedure involves observers visiting 10 to 12 randomly selected classrooms, for 15 min each, during a 3-hr visitation period. The observer examines classroom events and activities descriptively, not judgmentally. Notes are taken relative to the use or non-use of 24 target strategies. At the conclusion of the 3-hr visit, the observer summarizes the frequency with which each of the strategies was observed across all classes in general on a data summary form. The frequency is recorded via a 5-point rubric, ranging from 0 (*not observed*) to 4 (*extensively*). Two global items use three-point scales (low, moderate, high) to rate, respectively, the use of academically focused instructional time and degree of student attention and interest. In this study, 8 SOM visits were made at each school by trained observers, yielding 120 hr of observation in 388 Co-nect classrooms and 96 hr of observation in over 322 Comparison classrooms.

To ensure the reliability of data, observers receive a manual providing definitions of terms, examples and explanations of the target strategies, and a description of procedures for completing the instrument. The target strategies include both traditional practices (e.g., direct instruction, independent seatwork, and technology for instructional delivery) and alternative, predominately student-centered methods associated with educational reforms (e.g., cooperative learning, project-based learning, inquiry, discussion, using technology as a learning tool). The strategies were identified through surveys and discussions involving policymakers, researchers, administrators, and teachers, as those most useful in providing indicators of schools' instructional philosophies and implementations of commonly used reform designs (Ross, Smith, Alberg, & Lowther, in press).

After receiving the manual and instruction in a group session, each observer participates in sufficient practice exercises to ensure that his or her data are comparable with those of experienced observers. In a reliability study (Lewis, Ross, & Alberg, 1999), pairs of trained observers selected the identical overall response on the five-category rubric on 67% of the items and were within one category on 95% of the items. Further results establishing the reliability and validity of SOM are provided by Lewis et al. (1999) and Ross et al. (in press).

Survey of Computer Use (SCU). A companion instrument to SOM in this study was the SCU (Lowther, Ross, Clark, & Adcock, 1999). The SCU was com-

(Butler & Alberg, 1991). The inventory contains 49 items, with 7 items comprising each scale. Responses are scored through the use of Likert-type ratings ranging from 1 (*strong disagreement*) to 5 (*strong agreement*). Each scale yields scores ranging from 7 to 35, with higher scores being more positive. Additional items solicit basic demographic information on respondents.

Face validity of the school climate items and logical ordering of the items by dimensions were established during the development of the inventory (Butler & Alberg, 1991). Subsequent analysis of responses, including a concurrent validity study by Sterbinsky (2001), collected through administration of the inventory in a variety of school sites substantiated validity of the items and scales. Dimension descriptions and current internal reliability coefficients on the seven dimensions of the inventory, obtained using Cronbach's alpha, are as follows:

Order:

The extent to which the environment is ordered and appropriate student behaviors are present ($\alpha = .84$).

Leadership:

The extent to which the administration provides instructional leadership ($\alpha = .83$).

Environment:

The extent to which positive learning environments exist ($\alpha = .81$).

Involvement:

The extent to which parents and the community are involved in the school ($\alpha = .76$).

Instruction:

The extent to which the instructional program is well developed and implemented ($\alpha = .75$).

Expectations:

The extent to which students are expected to learn and be responsible ($\alpha = .73$).

Collaboration:

The extent to which the administration, faculty, and students cooperate and participate in problem solving ($\alpha = .74$).

Comprehensive School Reform Teacher Questionnaire (CSRTQ®).

The CSRTQ is a modification of an original instrument developed in 1996 for evaluating Memphis City Schools' implementation of NAS restructuring designs (e.g., see Ross et al., 1997). In 1999, the instrument was slightly revised to ensure generalizability across different districts and to include generally accepted school reform criteria such as the presence of measurable goals and benchmarks and evaluation strategies (Alberg & Ross, 1999).

The CSRTQ contains 28 items to which teachers respond using a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). In a second section, teachers report their perceived progress toward implementation benchmark goals. In a third section, they provide open-ended comments regarding the positive and negative aspects of their school's CSR program. Face validity and logical ordering of the items by scales were established by the research team during the development of the inventory (Ross et al., 1997). Principal component

pleted as part of the 15-min observation sessions only if students used technology during that time. As with SOM observations, SCU data were recorded in 15-min intervals and then summarized on an overall data form. The SCU items were compiled through examination of research, existing instruments (e.g., Apple Classrooms of Tomorrow researched by Stuebing, Celsi, & Cousineau, 1994), focus groups of K-12 teachers and administrators, researchers, college faculty, and a series of formative evaluation strategies. The reliability of SCU was determined in a study involving pairs of trained observers conducting SCU observations in 42 targeted visits to classrooms that were scheduled to have students using technology. Results from the study revealed that overall, the paired observers selected the identical SCU response on 86% of the items with all other responses only being one rating apart. When looking at subcategories of the SCU, the percentage of times that paired observers selected the same response was as follows: computer configuration, 83%; students per computer, 95%; student computer skills, 70%; types of computer activities/tools, 92%; subject areas of computer activities, 88%, and overall rubric rating meaningfulness of computer activities, 88% (Lowther & Ross, 1999).

The SCU was designed to capture exclusively student access to and use of computers rather than teacher use of technology. To define the scope of possible computer activities, the first section of the SCU collects data regarding the type of technology available to students in the classroom (e.g., computer type and age, Internet access, printer access), number of students per computer, level of engagement, and technical difficulties while working at the computers. A 5-level scale that ranges from 1 (*very low*) to 5 (*high*) was used to record the level of computer skills observed.

The next section of the SCU focuses on student use of computers with regard to types of activities, subject areas of activities, and software being used (production tools, Internet, and educational software). Within each category, generic activities associated with each type of software are identified; for example, under Production Tools, sample activities include word process (creative writing), design layout, generate results, and create presentations. With this type of recording system, several activities could be noted during the observation of one student working on a computer. The computer activities, subject areas, and software being used are summarized and recorded using a 5-point rubric that ranges from 0 (*not observed*) to 4 (*extensively observed*).

The final section of the SCU is an "Overall Rubric" designed to assess the degree to which the activity reflects "meaningful usage" of the computer as a tool to enhance learning. The rubric has four levels: 4 (*very meaningful*), 3 (*meaningful*), 2 (*somewhat meaningful*), 1 (*computer not used as a tool*).

School Climate Inventory (SCI®). The main purpose of the SCI is to assess impacts of reform initiatives in relation to seven dimensions logically and empirically linked with factors associated with effective school organizational climates

analyses of responses collected through administration of the inventory in multiple restructuring and comparison sites substantiated the instrument's four scales (Bol et al., 1998). All items loaded unambiguously on the four factors, which explained 63.2% of the variance in item scores. The factors (and concomitant reliability coefficients) included resources (.64), professional development (.76), pedagogical change (.67), and student outcomes (.91).

Interviews. Interviews with Co-nect teachers and principals were conducted to provide background information about schools' usage of the model to support more informed interpretations of outcomes. One teacher focus group, consisting of 5 to 7 randomly selected teachers, was conducted at each Co-nect school. Questions concerned teachers' experiences with and reactions to the design implementation with regard to such areas as design appropriateness, resources, professional development, and outcomes. The focus groups took place in the spring semester and generally lasted about 1 hr. The principal at each Co-nect school participated in a 1-hr, onsite interview in the spring semester. Interview questions addressed the principal's experiences and reactions to the design implementation and the associated outcomes for the school, students, faculty, parents, and community.

Student Achievement

Achievement data were derived from scores on the Tennessee Comprehensive Assessment Program (TCAP) for five subjects (math, reading, language, science, and social studies) over 3 years of testing (1998–2000). TCAP is a form of the CTBS/5 or "Terra Nova" edition (CTB/MacMillan/McGraw Hill, 1997).

Year-to-year gains were assessed using The Tennessee Value-Added Assessment System (TVAAS) developed by William Sanders and his colleagues at the University of Tennessee (Sanders & Horn, 1995a, 1995b). The particular measure used was the Cumulative Percent of the Norm mean or CPN. This statistic indicates across all grades reported (in this study, Grades 4–5) the percent of the national (expected) gain attained. For example, if School A had a CPN gain of 100% in math, it would be producing achievement gains at the national or expected level for that subject; a CPN of 50 indicates that only half (50%) of the national gain was attained. TVAAS uses statistical mixed-model methodology to enable a multivariate, longitudinal analysis of student achievement, and to aggregate those achievement year-to-year gain (or "value added") data to the classroom and school levels. TVAAS scores have been demonstrated to yield estimates of student and teacher effects that are statistically independent of socioeconomic confoundings and that do not require direct measures of these variables (Wright, Horn, & Sanders, 1997). Providing a detailed explanation of the statistical foundation of TVAAS would be beyond the scope of this article but is discussed in previously mentioned papers by Sanders and his associates.

Our analyses used school-level, rather than student-level, data. The latter approach would offer the advantages of examining gains as a function of design model and individual difference scores as well as generating residuals that could be compared for design versus comparison schools (Goldstein, 1995). The school-level approach, however, allowed us to pool results over grades (i.e., CPN as response variable) and over five subjects ("all-subjects-averaged"). These analyses would have been more difficult to perform validly with student-level data because of incomplete records (students lacking scores for all grades and all subjects). Also, given the small number of schools involved in the study, the purpose here was to examine globally and descriptively patterns across sites and for sites as "cases" that might be related to trends detected in implementation (see the following) and school change variables assessed (e.g., school climate, teaching strategies, and teacher attitudes). Inferential tests of significance were not possible given that schools (total $n = 9$) were the unit of analysis.

Design Implementation

Data on individual schools' progress in implementing Co-nect was provided for use in this study by the school district. As part of the restructuring initiative started in 1995, district curriculum-and-instruction specialists for the different designs being used visited individual schools multiple times during the year. During the visits, they observed classrooms and interviewed the principal and teachers, with a focus on the extent to which design-specific "implementation benchmarks" were attained. After all visits were complete, they completed a narrative on each school and, in the case of the Co-nect design, assigned a dichotomous global rating that placed the school in a "higher" or "lower" category of implementation progress and quality. These ratings and accompanying rationales were used in our study as general indicators of implementation status.

Procedure

At different times spread out over the school year, eight 3-hr school visits encompassing 388 Co-nect classes and 322 Comparison classes were made by trained observers. During the visits, the observer completed the SOM and, if computer activity occurred, the SCU. The visits were specifically scheduled to occur on varied days and times for each school. Teachers at each school were administered the CSRTQ and climate surveys at a faculty meeting in March. Thus, participation rates approached 100%, because only teachers who were absent did not complete the surveys. The second author and a research associate conducted principal interviews in the fall and teacher focus groups in the spring. Achievement data representing both mean percentiles and value-added scores were obtained from William Sanders and associates for the years 1995 to 2000.

RESULTS

School Observation Measure[®]

Descriptive results. As indicated in the description of SOM, the observation procedure primarily focuses on 24 instructional strategies using a 5-point rubric, 0 (*not observed*), 1 (*rarely*), 2 (*occasionally*), 3 (*frequently*), and 4 (*extensively*). For Co-nect classrooms, strategies viewed occasionally or more (frequently or extensively) in at least 30% of the classrooms included direct instruction (55% total), work centers (30%), higher-level instructional feedback (33%), project-based learning (35%), higher-level questioning (38%), teacher acting as coach or facilitator (48%), independent seatwork (50%), experiential learning (32%), and technology as learning tool (40%). For comparison classrooms, the only strategies observed at that level of frequency were direct instruction (75%), teacher acting as coach or facilitator (44%), and independent seatwork (65%). At the other extreme are strategies never or rarely observed.

Those in Co-nect classes reaching 95% or higher for these two lowest categories combined were team teaching, individual tutoring, ability groups, multi-age groups, systematic individual instruction, and student self-assessment. The same categories, with the exception of parent and community involvement, were also never or rarely observed in comparison classes, but with the addition of integration of subject areas, sustained writing, independent inquiry—research, computer for instructional delivery, and technology as a learning tool.

On the two final summary items, academically focused class time was rated as “high” in 73% of the visits to Co-nect classes, whereas level of student interest—engagement was rated as high in 60%. In comparison classes, these ratings were only 63% and 50%, respectively.

Inferential results. A 2 Program (Co-nect and comparison) \times 2 Socioeconomic Status (middle- and lower-SES) multiple analysis of variance (MANOVA) was conducted on the multiple SOM items. All three sources of variance were significant: program main effect, $F(26, 43) = 3.72, p < .001$; SES main effect, $F(26, 43) = 2.41, p = .005$; and the Program \times SES interaction, $F(26, 43) = 3.25, p < .001$. In follow-up analyses, univariate analyses were conducted on each item for each source of variance. Also, to determine the educational importance of differences, Effect Sizes (ES) were computed using Cohen's d formula (Cohen, 1988).

For the program main effect, significant effects were obtained on six items, two of which favored the comparison schools and four the Co-nect schools. Specifically, Co-nect schools had lower means than comparison schools on direct instruction (respective $M_s = 0.88$ and $1.70, p = .008, ES = -0.66$); and team teaching ($M_s = 0.02$ and $0.15, p = .029, ES = -0.48$). Co-nect schools had higher means on project-based learning ($M_s = 1.37$ and $0.53, p < .001, ES = 0.93$), sustained writing

($M_s = 0.92$ and $0.48, p = .009, ES = 0.70$), computer for instructional delivery ($M_s = 0.52$ and $0.36, p = .009, ES = 0.70$), and technology as a learning tool ($M_s = 1.20$ and $0.34, p < .001, ES = 1.14$).

Follow-up tests for the SES main effect yielded significant differences for five items. Because this effect combines Co-nect and comparison groups, it was less relevant to the present research interests and therefore will be treated more briefly. Results favoring the lower-SES schools were for team teaching ($p = .005, ES = -0.57$), work centers ($p = .001, ES = -0.87$), and experiential learning ($p = .003, ES = -0.79$). Comparisons favoring the middle-SES schools were teacher as coach/facilitator ($p = .014, ES = 0.52$) and performance assessments ($p = .001, ES = 0.85$).

Of greater research interest were the nine significant Program \times SES interactions in the univariate analyses. Each was followed up using one degree of freedom contrasts (with $df = 315$ in error term) of means (a) between programs within SES groups and (b) between SES groups within programs. A summary of significant findings is provided in Table 2.

As may be seen in Table 2, the lower-SES Co-nect schools surpassed the lower-SES Comparison schools on independent inquiry, technology as a learning tool, and level of student attention/interest. In contrast, middle-SES Co-nect classes showed less usage than did middle-SES Comparison classes of higher-level instructional feedback, teacher coaching, and student self-assessment; and less usage than did lower-SES Co-nect classes of ability grouping, higher-level feedback, and independent inquiry.

Summary. The inferential and descriptive results (see Tables 2 and 3) depict Co-nect classes relative to comparison classes as generally more active learning contexts, characterized by greater use of technology, writing, projects, and cooperative learning. Not surprisingly, technology usage and projects are two primary emphases of the Co-nect design. An inconsistent finding, however, was that other encouraged student-centered strategies—performance-based assessment and student self-assessment—were not more frequently seen in Co-nect relative to comparison classes. Co-nect effects on instruction, particularly in the direction of inducing active learning (e.g., projects, inquiry, higher student engagement) were more evident at the lower-SES than higher-SES schools.

Survey of Computer Use

Out of the 388 total Co-nect and 322 total comparison classes visited, the number of classes observed using technology were 87 (22%) and 11 (3%), respectively. Thus, computer usage was roughly 8 times more likely to be seen in a Co-nect than comparison class. Given the exceedingly limited amount of comparison school data, the SCU results are examined descriptively with only informal comparisons made between school groupings.

TABLE 3
Means and Standard Deviation for Co-nect and Comparison Schools on the Comprehensive School Reform Teacher Questionnaire

Scales ^a	Program	Low-SES		Middle-SES		Combined SES	
		M	SD	M	SD	M	SD
Professional development	Co-nect	3.83	0.63	3.63	0.62	3.74	0.63
	Comparison	3.23	0.78	3.52	0.76	3.40	0.78
Resources	Co-nect	3.58	0.72	3.71	0.61	3.64	0.67
	Comparison	2.86	0.79	3.36	0.87	3.16	0.87
Pedagogical change	Co-nect	3.67	0.54	3.69	0.61	3.68	0.57
	Comparison	3.29	0.64	3.73	0.66	3.56	0.68
Outcomes	Co-nect	3.41	0.57	3.51	0.51	3.45	0.54
	Comparison	2.75	0.71	3.37	0.72	3.12	0.77

Note. n = 53 (Low Co-nect); n = 46 (Middle Co-nect); n = 61 (Low Comparison); n = 94 (Middle Comparison); SES = socioeconomic status.
^aScale means can range from 1 (negative attitude) to 5 (positive attitude).

With regard to classroom equipment resources and student skills, Co-nect and comparison classes were fairly comparable, typically containing from one to six computers, most of which were "up-to-date" Macintoshes having both printer and internet access. In Co-nect classes, however, the computers were more likely to be clustered together than was the case in comparison classes. The following results reflect types of computer activities that were observed at least occasionally in 20% or more classrooms that had students using computers. In the Co-nect classrooms, students were using computers for creative writing (40%), entering data (20%), and drawing or creating design layouts (20%). Subject areas for production tool activities included language arts (60%) and social studies (40%). Educational software uses consisted of learn-review applications (40%) in the subjects of language arts (40%) and math (20%), using word processing (40%), drill/practice/tutorial (60%), and "other" (20%) software. In comparison schools, only two areas were observed occasionally or more in 20% of the visits: create presentations (50%) and using presentation software (50%).

Teacher Questionnaire

A 2 (program) x 2 (SES) MANOVA was performed on the four CSRTQ scales of Professional Development, Resources, Pedagogical Change, and Outcomes. Means and standard deviations for the four groupings of schools are presented in Table 3. The means show generally more positive responses at Co-nect schools than at comparison schools, and for middle- than lower-SES schools. The MANOVA showed all three sources of variance to be significant: program main ef-

Summary of Significant Outcomes for the Program x SES Interaction on the School Observation Measure

TABLE 2

SOM Item ^a	Univariate F	Problem Level	Group With Higher Mean		Group With Lower Mean	
			SES	Program	SES	Program
Team teaching	4.95	Low	Comp ^b	3.13	Low	Cnc ^c
Ability group	.930	Middle	Comp	0.38	Middle	Cnc
Higher level instructional feedback	4.50	Middle	Comp	1.31	Middle	Cnc
Teacher as coach/facilitator	7.92	Low	Cnc	1.58	Middle	Cnc
Independent inquiry	14.41	Low	Cnc	0.31	Low	Comp
Technology as learning tool	6.26	Low	Cnc	1.38	Middle	Cnc
Student self-assessment	5.24	Middle	Comp	0.38	Middle	Cnc
Level of student attention/interest	4.90	Low	Cnc	2.71	Low	Comp

^aAll SOM items, with the exception of Student Attention/Interest were rated on a 5-category rubric: 0 (not observed), 1 (rarely), 2 (occasionally), 3 (frequency), 4 (extensively). Student attention/interest was rated as follows: 1 (low), 2 (moderate), 3 (high).
^bComp = Comparison schools; Cnc = Co-nect schools.
^cSignificantly lower at $p < .05$ than the high group in post hoc test. **Significantly lower at $p < .01$ than the high group in the post hoc test. ***Significantly lower at $p < .001$ than the high group in the post hoc test.

understanding the school's educational goals (76% agreement), technology resources have become more available (80%), the program has changed classroom learning activities (75%), students learn cooperatively (75%), and teachers spend more time planning (78%). In contrast, comparison schools had 75% or higher agreement on only one item—thorough understanding of the school's goals (76%).

For Co-nect teachers, there was 25% or higher disagreement regarding the adequacy of professional development (37%), given sufficient time to implement program (44%), materials needed for implementation are readily available (30%), parents are more involved than in the past (32%), community support is higher (26%), and the plan accommodates special-needs students (29%). For comparison schools, there were many items (18/30) with over 25% disagreement. Those having the highest levels (above 40%) were as follows: sharing knowledge with other educators (41%), teachers are given sufficient planning time (55%), students are more enthusiastic (46%), parents are more involved (44%), community support is higher (43%), and students have higher standards for their work (43%).

In summary, Co-nect teachers were significantly more positive about many different elements of their school program than were comparison teachers. In considering the Program x SES interaction, however, a confounding factor is that both middle-SES Co-nect schools began implementation in 1995, whereas the lower-SES group included one 1995 start-up school and two 1997 start-up schools. Thus, the lower-SES Co-nect schools were less experienced. Even so, the lower-SES Co-nect group showed larger overall advantages over the lower-SES comparison schools than occurred at the middle-SES level.

When we inspected the data for individual schools, the 5-year (1995) lower-SES school (Cnct-5 in Table 1) did, in fact, appear more positive on most items than were the 3-year (1997) lower-SES schools (Cnct-3 and Cnct-4). Items reflecting the largest differences favoring Cnct-5 over Cnct-3 and Cnct-4 combined dealt with understanding the design (83% vs. 13% agreement), the adequacy of initial training (58% vs. 39%), the sufficiency of planning time (56% vs. 33%), the sufficiency of staff (84% vs. 68%), and teacher support (77% vs. 54%).

School Climate

Table 5 summarizes program means on the seven SCI dimensions by Program and SES stratum. The 2 (Program) x 2 (SES) MANOVA yielded a significant Program main effect, $F(7, 309) = 11.79, p < .001$; and significant SES main effect, $F(7, 309) = 4.96, p < .001$. The two-way interaction, however, did not reach significance, $F(7, 309) = 1.82, p = .081$. Follow-up analyses of univariate effects revealed significant program differences on six out of the seven dimensions: Order ($p < .001, ES = 0.45$), Leadership ($p = .002, ES = 0.27$), Environment ($p < .001, ES = 0.47$), Involvement ($p < .001, ES = 0.85$), Expectations ($p = .001, ES = 0.34$), and Collaboration ($p < .001, ES = 0.46$). The dimension not showing significant differences

effect, $F(4, 247) = 8.84, p < .001$; SES main effect, $F(4, 247) = 6.47, p < .001$; Program x SES interaction, $F(4, 247) = 2.57, p = .038$.

Follow-up univariate 2 x 2 ANOVAs were next performed on each of the four scales. The Program main effect was significant and showed higher Co-nect than Comparison means on all scales. For Professional Development, $F(1, 315) = 14.32, p < .001, ES = -0.46$. Co-nect schools averaged 3.74 compared to 3.40 for Comparison schools. For Resources, $F(1, 315) = 27.73, p < .001, ES = 0.30$, the respective means were 3.64 and 3.16. For Pedagogical Changes, $F(1, 315) = 4.29, p = 0.39, ES = 0.43$, they were 3.68 and 3.56, whereas for Outcomes, $F(1, 315) = 21.23, p < .001, ES = 0.51$, they were 3.45 and 3.12.

For the SES main effect, univariate analyses were significant for Resources ($p = .002$), Pedagogical Change ($p = .006$), and Outcomes ($p < .001$), but not Professional Development ($p = .630$). As shown in Table 3, teachers at the middle-SES schools tended to be more positive in their reactions than were those at the lower-SES schools.

The Program x SES interaction was significant on all subscales except Resources ($p = .068$). For the subscales showing significance, follow-up F tests with one degree of freedom ($\alpha = .05$) were performed to compare means (a) across SES levels within each program and (b) across programs within each SES level. A summary of significant findings is provided in Table 4. As revealed by the interaction patterns, Co-nect's positive impacts on teacher satisfaction with CSR components were primarily concentrated at the lower-SES level.

Informative descriptive data are provided from teacher responses to individual CSRTQ items. For Co-nect schools, areas showing 75% or higher agreement were

TABLE 4
Summary of Significant Outcomes for the Program x SES Interaction on the Comprehensive School Reform Teacher Questionnaire

CSRTQ Item ^a	Univariate F	Problem Level	Group With Higher Mean		Group With Lower Mean	
			SES	Program M	SES	Program M
Professional development	6.65	.01	Middle Comp ^b	3.83	Low Comp	3.23***
			Low Cnct ^c	3.52	Low Comp	3.23*
Pedagogical change	6.58	.011	Middle Comp	3.73	Low Comp	3.56**
			Low Cnct	3.51	Low Comp	3.56***
Outcomes	17.10	.001	Middle Comp	3.37	Low Comp	2.75***
			Low Cnct	3.41	Low Comp	2.75***

Note. SES = socioeconomic status.
^aScale range was from 1 (negative attitude) to 5 (positive attitude).
^bComp = Comparison schools. ^cCnct = Co-nect schools.
 *Significantly lower at $p < .05$ than the high group in post hoc test. **Significantly lower at $p < .01$ than the high group in the post hoc test. ***Significantly lower at $p < .001$ than the high group in the post hoc test.

TABLE 5
Means and Standard Deviations and Comparison for Co-nect
and Comparison Schools on the School Climate Inventory

Dimension ^a	Program	Low-SES		Middle-SES		Combined SES	
		M	SD	M	SD	M	SD
Order	Co-nect	22.71	6.02	23.45	4.92	23.03	5.58
	Comparison	18.72	5.54	21.93	5.18	20.50	5.57
Leadership	Co-nect	25.83	4.70	28.43	3.77	26.93	4.50
	Comparison	24.15	5.07	26.81	4.91	25.63	5.14
Environment	Co-nect	26.48	5.00	27.95	4.51	27.10	4.83
	Comparison	22.51	5.27	26.45	4.83	24.69	5.38
Involvement	Co-nect	27.96	2.88	28.64	3.53	28.25	3.18
	Comparison	25.67	3.97	24.32	4.21	25.06	4.12
Instruction	Co-nect	26.91	3.20	27.86	3.91	27.31	3.53
	Comparison	27.33	2.81	26.00	3.89	26.73	3.39
Expectations	Co-nect	26.23	4.29	27.14	4.34	26.61	4.32
	Comparison	24.35	4.62	25.73	4.29	25.11	4.48
Collaboration	Co-nect	25.34	4.63	27.18	3.47	26.11	4.26
	Comparison	22.61	4.84	25.24	3.92	24.06	4.53
Composite	Co-nect	25.93	3.58	27.23	3.34	26.48	3.53
	Comparison	23.23	4.02	25.59	3.52	24.54	3.92

Note. $n = 78$ (Low Co-nect); $n = 57$ (Middle Co-nect); $n = 82$ (Low Comparison); $n = 102$ (Middle Comparison); SES = socioeconomic status.

^aDimension means can range from 7 (low) to 35 (high).

was Instruction ($p = .067$). In every comparison of means (including those within SES groups), the Co-nect schools surpassed the comparison schools.

Univariate analyses for the SES comparison were significant on every dimension (with all $ps < .01$). The middle-SES schools consistently surpassed the lower-SES schools. Although the multivariate interaction effect did not reach significance ($p = .08$), the pattern on several dimensions (e.g., Order and Environment) showed a smaller disparity favoring the middle-SES group in Co-nect schools than in Comparison schools (see Table 5).

Teacher Focus Group

Qualitative analysis of responses from the five focus groups revealed general support for the Co-nect model and agreement that it had positively impacted classroom practices, yet some aspects of program implementation were considered problematic. The teachers described their classrooms as having more use of technology, hands-on activities, multidisciplinary projects, cooperative learning, and authentic assessment because of Co-nect. Most teachers indicated that the students were more motivated and enthusiastic and displayed improved social and communication skills when working in groups.

The teachers reported that another positive impact of the Co-nect model was increased communication and interactions among themselves due to working in clusters during common planning times. All teachers commented that they not only enjoyed getting to know their fellow teachers better but that the planning time provided continual professional development which resulted in improved teaching practices. The teachers enjoyed collaboratively planning common projects that were implemented by all the teachers in their group, with some incorporating team teaching into certain aspects of the projects.

Areas of Co-nect viewed less favorably included time requirements, resources, and assessment. Most teachers reported that it took much more time to plan and implement project-based lessons that were cross-disciplinary, involved hands-on learning, and integrated student use of computers. A few teachers indicated that projects would sometimes yield student results or products that fell short of expectations, which was disappointing considering the extra time and effort expended in project development. There was a general consensus that the teachers still did not have enough computer training to successfully integrate technology into project work. Others felt that technology resources, although greatly increased since Co-nect had been adopted, were still inadequate for full implementation of the model.

An additional concern of teachers was the perceived incompatibility of state-wide standardized testing with Co-nect's focus on higher-order learning. Most teachers felt they had to "stop" Co-nect to prepare students for the state test. Along the same lines, teachers who used authentic assessments (rubrics and portfolios) felt they had to revert to traditional methods when reporting student performance on the required report cards. In other words, teachers felt they were doing twice the work.

Teachers were moderately positive about training sessions, but were less favorable about support received from Co-nect, indicating that the representatives often had difficulty relating with the teachers and rarely aligned their interventions with actual needs at each school. Most teachers did, however, feel positive about the Critical Friends visits in that they allowed interactions with other Co-nect teachers.

Principal Interviews

The five principals were generally positive with regard to implementing Co-nect in their schools. The primary change was that teachers were assuming more decision-making responsibilities, thus allowing the principals to serve more as facilitators and monitors of progress. Among the new responsibilities acquired were securing technology hardware and software, reconfiguring classrooms to handle the technology, reformulating schedules to provide common planning time, hiring new staff to cover classes during cluster meetings, and providing guidance involving the handling of curriculum and teaching changes.

The principals listed the following as the most effective elements of Co-nect: grade-to-grade portfolios, curriculum-mapping, teachers working in teams, students working on projects, and students and teachers using more technology. The least effective aspects of the model included multigrade classrooms, use of traditional report cards while implementing authentic assessments, and the difficulty some teachers experienced in using a hands-on, problem-based approach.

The principals further agreed that (a) most teachers supported Co-nect and its continuation at the school; (b) student learning had been positively impacted by the classroom level changes that had occurred as a result of implementing the model; (c) students seemed more at ease, more confident, and more engaged in learning than when teachers primarily lectured and used seatwork; and (d) overall, implementation of Co-nect increased the focus on learning and communication between teachers and students.

Student Achievement Outcomes

With the small number of schools in the Co-nect and comparison samples, a clear determination of program effects on student achievement cannot be made from the present data. Instead, we will report overall findings for the nine schools, informal analyses of program results, and brief "case studies" of the five Co-nect schools' progress in raising achievement in association with design implementation and other outcomes.

Achievement results were examined from Spring 1998 to Spring 2000 for all subjects averaged. In some instances, especially where a school began implementation in 1995-1996, we report earlier results to extend the depiction of trends. The rationale for using the subject average was to derive a more reliable measure and reduce the number of separate scores to be examined for present, descriptive analysis purposes (see Ross et al., 2001). Because state testing began in Grade 3, these scores were derived from Grades 4 and 5 averaged, the only elementary school grades for which value-added scores (cumulative percent of the norm or CPN) scores can be derived. We examined both mean percentile scores and CPN scores to judge trends for the Co-nect and comparison schools. The mean percentile scores were computed by converting the TVAS mean scale scores (for the school, district, and state) into the corresponding percentiles from the Terra Nova tables. It should be considered in comparing results across years that fluctuations are due, in part, to differing difficulty levels of the administered parallel test forms. Thus, it is important to judge district, school, or program gains or losses relative to those for the entire state in the same years.

Compared to comparison schools ($n = 4$), elementary schools in the entire school district ($n = 105$), and elementary schools in the entire state ($n = 639$), three of the Co-nect schools appeared successful in raising achievement, whereas two appeared unsuccessful. Table 6 summarizes the percentile means for the different

schools and comparison norms. Note that from 1998 to 2000, state percentile means were 47.4, 50.7, and 52.6, whereas those for the district were 37.3, 38.4, and 37.1. Figure 1 graphically depicts the change in mean percentile from 1998 to 2000 for individual schools in the study compared to the district and state. Relative to the state average of a +5.2 percentile point change and the district average of -0.2, three of the Co-nect schools (1, 2, and especially 4) demonstrated positive gains, whereas two showed negative gains. The comparison schools showed less pronounced changes, with two slightly higher than the district, one comparable to the district, and one slightly lower.

A similar comparison can be made with the CPN scores on which the state averaged 112.3, 105.2, and 99.6 in 1998, 1999, and 2000, respectively; and the district averaged 119.1, 109.2, and 84.9 in the same years. Identification of successful and unsuccessful schools in our sample relative to these norms showed basically similar outcomes to those of the percentile scores. However, year-to-year fluctuations in score scales that operate differently from one another make the patterns for individual schools more complex. In the interest of clarity, we will therefore review results for each school in the brief "case studies" in the following sections. Readers should consider that for Co-nect schools that began implementation in 1995, the data for 1998-1999 represent respectively, 3, 4, and 5 years of implementation. For 1997 Co-nect schools, the 3 years represent

TABLE 6
Mean Percentile Scores for Co-nect (Cnct) and Comparison (Comp)
Schools from 1998-2000: All Subjects Averaged
Versus District and State Norms

Schools and Program	SES	Year		
		1998	1999	2000
Co-nect				
Cnct-1	Middle	38.9	49.3	48.9
Cnct-2	Middle	49.0	55.7	56.1
Cnct-3	Low	37.9	27.6	26.1
Cnct-4	Low	46.2	58.1	65.1
Cnct-5	Low	29.4	27.6	22.1
Comparison				
Comp-1	Middle	47.5	49.3	50.3
Comp-2	Middle	67.4	78.2	77.1
Comp-3	Low	29.7	31.9	29.8
Comp-4	Low	25.0	28.3	22.9
Norms				
District	NA	37.3	38.4	37.1
State	NA	47.4	50.7	52.6

Note. SES = socioeconomic status.

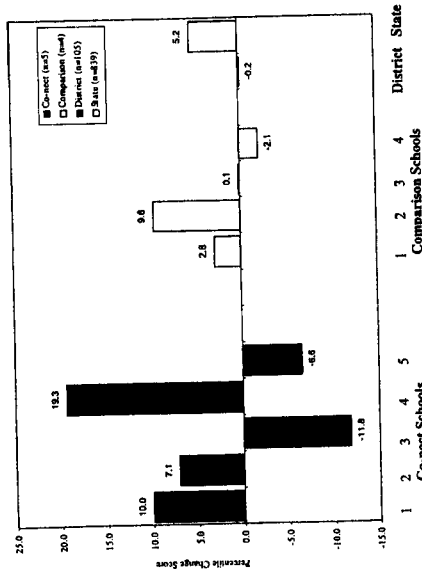


FIGURE 1 Pre-reform to post-reform changes in percentile scores for all Tennessee Comprehensive Assessment Program subjects.

Years 1, 2, and 3. Using a holistic subjective assessment of the achievement patterns, we conclude each case by assigning the school a rating of success in raising achievement up to the most recent year of assessment (2000) according to the following three broad categories: successful, mixed results, and unsuccessful. Each achievement summary is followed by a brief synthesis of qualitative findings considered relevant to the school's progress in restructuring.

Cnct-1. This middle-SES school began Co-nect in 1995. Its district rating on implementation placed it in the higher (more positive) grouping in 1999-2000. With regard to achievement, Cnct-1 substantially raised its mean percentile score from 38.9 in 1998 to 49.3 in 1999, with a slight decline to 48.9 in 2000. The 1998 to 2000 gain exceeded the state and district by about 5 and 10 points, respectively. Cnct-1's CPN means showed an uneven pattern, averaging 109.0 in 1998, soaring to 144.3 in 1999, and dipping to 94.4 in 2000. However, the latter drop was comparable to that of the state and less than that of the district. Overall, we would characterize Cnct-1 as *successful* in raising student achievement.

A qualitative profile on Cnct-1 also yields a positive perspective. As noted earlier, its implementation was rated as high. School climate means, especially in Leadership ($M = 27.5$) and Involvement ($M = 27.4$), were also relatively and absolutely high. On the CSRTQ, 76% of the teachers agreed that they "had a thorough

understanding of the school's plan and goals," whereas 78.4% of the teachers agreed that they supported the school's plan.

Cnct-2. This middle-SES Co-nect school also began restructuring in 1995 and was categorized in the higher implementation group by the district experts. Achievement outcomes indicated a steady increase in mean percentile from 49.0 in 1998 to 55.7 in 1999 and to 56.1 in 2000. These outcomes represent both higher absolute performance and higher gains in percentile over time than demonstrated for both the state and district. CPN results for Cnct-2 were similarly impressive, averaging 103.3, 141.4, and 132.1, for the respective 3 years. Note that the latter (Year 2000) mean surpassed that of the state by 33 points and that of the district by 47 points, indicating noticeably higher yearly gain by the average Cnct-2 student. Overall, we characterize Cnct-2 as *successful* in raising student achievement.

The qualitative profile of Cnct-2 is extremely positive in all areas. First, its implementation of Co-nect was rated as high. Second, its school climate means were the highest of all seven schools, most notably on Environment ($M = 31.8$) and Involvement ($M = 30.7$). Third, CSRTQ responses were clearly supportive of the school and its reform efforts, with 85% of the faculty agreeing that the reform model was helping the school meet achievement goals, and 80% agreeing that they have a thorough understanding of the model.

Cnct-3. This lower-SES school started implementing Co-nect in 1995. In 1999-2000, it was evaluated by the district as being in the lower implementation group, although the weaknesses were not viewed as substantial. Cnct-3's 3-year pattern of achievement showed declines in mean percentile score from a high of 37.9 (about even with the district) in 1998, to 27.6 in 1999, and to a low of 26.1 in 2000 (11 points lower than the district). The CPN outcomes were even more discouraging, starting with an exceptionally high 169.6, declining to 64.0, and then to the very low 36.7 (about 48 points lower than the district). When we traced Cnct-3's achievement history further back, we found that in its pre-reform year (1995), its percentile mean was only 22.3 (16 points below the district mean). Thus, while Cnct-3 seemed to be experiencing a spiral of decline, even its marked drop in 2000 represents some limited absolute and relative progress over a 5-year span. From an overall perspective, and particularly with attention to the last 3 years, we regard Cnct-3 as *unsuccessful* in raising student achievement.

The qualitative profile of Cnct-3 is generally positive, although not to the same extent as the above two Co-nect schools. As noted, Cnct-3's implementation of the model showed no major deficiencies but overall, placed it in the lower category. School climate was fairly high in most areas, especially Environment ($M = 29.0$) and Instruction ($M = 28.3$), but its lower Order mean ($M = 22.7$) reflects some student discipline problems. On the CSRTQ, over three fourths (75%) of the teachers agreed both that they understood the reform and were supportive of the reform

model. In general, Cnct-3's less successful achievement pattern is not well explained by these other, more positive outcomes.

Cnct-4. This lower-SES school started implementing Co-nect in 1997. In 1999-2000, it was evaluated by the district as being in the higher-implementing category. In its pre-restructuring year (1997), Cnct-4 had a mean percentile score of 51.0. After 1 year of implementation (1998), the mean dipped to 46.2, but then noticeably increased to 58.1 and 65.5 in the next 2 years. As shown in Figure 1, its 2-year gain was over 19 points higher than that for the district and nearly double that of any other school in the present study. CPN means reflecting yearly gain were also positive but less pronounced, starting in pre-reform (1997) at 106.8 and then fluctuating in the next 4 years from 101.7, to 114.3, and down to 104.3. The latter, most recent CPN mean, however, was approximately 20 points higher than the district mean and 5 points higher than the state mean. Overall, we would characterize Cnct-4 as *successful* in raising student achievement.

The qualitative profile of Cnct-4 is consistent with its positive achievement pattern. In addition to its high implementation status, Cnct-4 showed clearly above-average school climate indexes, with the highest dimensions being Leadership ($M = 29.6$) and Involvement ($M = 28.4$). Teachers' CSRTQ responses indicated good understanding of the reform (77.3% agreement) but not as high of a buy-in (only 45.5% agreement) to the reform as the foregoing three Co-nect schools. The latter reaction might have been due, in part, to teachers' concerns about the adoption of Co-nect compromising the school's former status and positive reputation as a technology-oriented magnet. SOM observations showed relatively diverse teaching methods, with high student engagement and strong focus on higher-level learning.

Cnct-5. This lower-SES school started implementing Co-nect in 1997. It was classified as lower-implementing in the district evaluation. An examination of Cnct-5's mean percentile scores for a 4-year period starting with pre-reform in 1997 shows an uneven pattern. From the pre-reform baseline mean of 26.5, achievement increased to a high of 29.4 the next year, slightly dipped to 27.6 in 1999, and then sharply declined to 22.8 in 2000. The same pattern was reflected in the CPN means of 85.3, 94.4, 78.6, and 22.8 in the respective 4 years. All of the latter means are substantially lower than those for the district and state. In trying to interpret the dramatic drop that the Cnct-5 experienced in 2000, it seems relevant to note that the principal who helped to bring Co-nect to the school left at the beginning of that year. Overall, we would characterize Cnct-5 as *unsuccessful* in raising student achievement.

The profile for Cnct-5 shows a prevalence of negative factors likely to have impeded the reform process. In addition to the loss of its principal and to being rated relatively low in its design implementation, Cnct-5 showed unfavorable school cli-

mate scores, particularly on Order ($M = 19.1$). Although two thirds (67%) of the teachers indicated that they understood the school's plan and goals, only about one third (39%) believed that the faculty was supportive of that plan. Further, the year after adopting Co-nect, the principal of Cnct-5, who had been highly influential in selecting and supporting the design, transferred to a different school.

Comp-1. From 1998-2000, this higher-SES Comparison school had mean percentile scores of 47.5, 49.3, and 50.3. Thus, as shown in Figure 1, its 3-year gain was lower than that for the state but higher than that for the district. CPN scores for the same period were 120.1, 114.1, and 102.3, all higher than the district and state norms. Overall, we would characterize Comp-1 as *successful* in raising student achievement.

Comp-1's qualitative profile reveals generally positive conditions. School climate scores were low in Order ($M = 19.1$) but average to above-average on all other dimensions. About 90% of the teachers indicated that they understood the plan and goals, and 67% believed that faculty were supportive. Teaching methods strongly emphasized traditional practices such as direct instruction (with higher-level feedback) and seatwork.

Comp-2. This higher-SES Comparison school had a mean percentile score of 67.4 in 1998 and means bordering on that level in prior years. In 1999, its mean increased over 10 points to 78.2 and then, in 2000, dropped only slightly to 77.0. Comp-2's mean CPN was 104.1 (-1.5 point deficit relative to the district) in 1999, rose sharply to 124.2 in 1999 (+5 point advantage), and then declined to 94.1 (still a +4 point advantage) in 2000. Overall, we would characterize Comp-2 as *successful* in raising student achievement.

Comp-2 demonstrated one of the more positive qualitative profiles of the nine schools. School climate was relatively high in all areas, especially on Involvement ($M = 28.8$) and Expectations ($M = 28.4$). On the CSRTQ, 80% of the faculty indicated that they understood the school's plan and goals, while 75% viewed the faculty as being supportive of the plan. Classroom observations further reflected high academic focus and student engagement.

Comp-3. This lower-SES Comparison school demonstrates a relatively flat achievement pattern, averaging between 28.6 and 31.9 in mean percentile for a 6-year period from 1995 to 2000. As shown in Figure 1, consistent with district but slightly lower than state norms, Comp-3 experienced virtually no change from 1998 to 2000. CPN means for Comp-3 have equivocal implications as they show consistent advantages relative to both the state and district in all 3 years (1998 = 159.1, 1999 = 149.2, and 2000 = 109.6), but a downward pattern over time. Overall, we would characterize Comp-3 as showing *mixed* results in raising student achievement.

The qualitative profile for Comp-3 reflects mostly negative indicators that seem consistent with its mixed but overall downward achievement pattern. School climate was average to below-average on all dimensions. Perhaps more revealingly, only about half (55%) of the teachers indicated understanding the school's plan and goals, whereas less than one third (29%) viewed the faculty as supportive of the plan. Many other CSRTQ responses reflected extremely low faculty buy-in to the school's direction and educational program.

Comp-4. This lower-SES Comparison school has experienced a variable but generally downward pattern of student achievement over time. Over a 6-year period its lowest mean percentile was 19.9 in 1997 and its highest was 28.3 in 1999. As shown in Figure 1, during the 3-year period from 1998 to 2000, it declined 2.1 points, a less favorable trend compared to both the state (+5.2) and the district (-0.2). CPN means reached their highest level of 139.1 in 1998 and second highest of 120.1 in 1999, but plummeted to only 88.3 in 2000. Overall, we would characterize Comp-4 as *unsuccessful* in raising student achievement.

Comp-4's qualitative pattern was predominantly negative. School climate outcomes were below-average to average. Notably, on the Order scale, 86% of the teachers believed that student behavior interfered with teaching. CSRTQ responses showed fairly high teacher understanding (84% agreement) of the school program and goals, but relatively low teacher support (58%) for them. Of the nine schools in the sample, Comp-4 had the second lowest SOM ratings of academic focus and by far the lowest ratings of student engagement.

DISCUSSION

Results of this study showed differences between Co-nect schools and similar (comparison) schools on multiple variables reflecting school change. Achievement outcomes were mixed, showing positive results relative to the state and district for three of the Co-nect schools but negative outcomes for two of the schools. As Datnow and Stringfield (2000) have noted, "a reform can only impact students if it is implemented" (p. 193). Continuing with this logic, one might expect a reform to raise student achievement at a school only if it implements conditions likely to foster more effective teaching and learning. Thus, in this study, we attempted to examine such conditions as represented by program differences in school climate, teaching strategies, and teacher-principal perceptions regarding the school-wide program. In the following sections, we present and discuss the conclusions reached relative to the five research questions that guided the study.

Co-nect Engendered Greater Use of Student-Centered Teaching Strategies

The observation data, based on visits to approximately 80 classrooms at each school, revealed that Co-nect classes were generally more active learning contexts than were comparison school classes. Strategies more likely to be observed in Co-nect schools were sustained writing, project-based learning, independent inquiry, and cooperative learning. In contrast, comparison classes were more traditional in orientation, with greater emphasis on direct instruction and seatwork. Although Co-nect classes tended to surpass comparison classes in performance assessment and student self-assessment, they employed these strategies very infrequently and not at a level commensurate with design emphases. Our results suggest that, even after 5 years of restructuring, teaching in Co-nect schools had become and remained more student-centered and constructivist in orientation.

Co-nect Engendered Greater Use of Technology as a Learning Tool

Both the classroom observations and teacher reports showed that Co-nect classrooms clearly made much greater use of computer technology than did comparison classrooms. In fact, in the lower-SES comparison schools, no computer usage was seen in 100 total hours of observation. Given that these schools are serving highly disadvantaged populations, it is a reasonable conclusion that the children are receiving little exposure to computers in their lives. Co-nect schools, in contrast, provided more consistent opportunities to use computers for learning in diverse subjects and tasks. What was considered "meaningful use" of computers was at least occasionally seen in 40% of the observed applications. Given many teachers' reluctance to use technology and lack of preparation for integrating it effectively with curriculum (Morrison, Lowther, & DeMeulle, 1999; Nicaise & Barnes, 1996), these results appear promising. Still, computer activities were not always visible in Co-nect classes. Internet usage, for example, was never observed while many of the other uses were concentrated in lower-level applications mainly involving drill/content/tutorial-type programs. Despite the obvious progress compared to the Comparisons, even the Co-nect schools show room for growth.

Co-nect Appeared to Create More Positive School Climate

School climate results showed significantly higher means for Co-nect than comparison schools on six of the seven dimensions. The strongest differences relative to comparison schools occurred on the Involvement dimension ($ES = +0.85$). Items on this dimension deal with the degree to which parents and the community are involved in the school, a core area of the Co-nect program. Other relatively strong ef-

fects (all $ESs > +0.45$) occurred on Environment, Collaboration, and Order, which collectively deal with harmony, respect, and cooperation among teachers and students. While this posttest-only analysis can only be suggestive of actual program effects, the consistency of climate advantages for the Co-nect schools is noteworthy. That is, if the nine schools in the study are rank-ordered on the basis of the cumulative school climate mean, four of the Co-nect schools occupy the top five positions. Only Cnct-5 (rank = 7) performed relatively poorly, while still surpassing half of the Comparison schools.

Co-nect was Generally Well-Received by Teachers and Principals

Co-nect teachers were clearly more favorable toward many aspects of their school program than were comparison teachers. Drawing from the teacher survey and focus groups, among the specific areas to which the Co-nect teachers reacted most positively were understanding school goals, using technology, students working cooperatively, increased planning time, and using projects. Both teachers and principals, particularly at the lower-SES Co-nect schools, perceived students to be more engaged and successful in learning than had been the case in the past. These types of impacts seem typical of intermediate results from reform projects offering schools new resources and interventions to improve education (Cervone & McDonald, 1999; Fullan, 2000). It is also noteworthy that the most positive teacher attitudes were obtained at the more experienced schools, which were completing their fifth year of design implementation. However, despite positive climate and cultural impacts, the sustainability of educational reforms in individual schools and districts may ultimately depend on the ability to show demonstrated improvement in students' standardized test scores within 3 or so years (Bodilly, 1998). The final research question examined this area.

Co-nect Schools Showed Mixed Results in Raising Achievement Compared to District and State Norms

In attempting to draw conclusions about program effects on student achievement, it is important to note the restriction of this sample to only five Co-nect schools located in a single district and differing in duration and quality of implementation. As indicated earlier, the findings show a highly variable pattern, with three of the Co-nect schools showing favorable outcomes and two showing unfavorable outcomes. Similarly, outcomes for the comparison schools were also mixed, but generally appeared less extreme, for example, more modest advantages or deficits relative to comparison norms.

The finding that schools from the same district using the same CSR program do not realize comparable achievement gains is consistent with other research on school reform (Berends, 1999; Ross, Sanders, et al., 2000). Factors such as school

leadership, teacher buy-in, and school characteristics (e.g., higher or lower poverty) are strong determinants of how well implementation of a design takes hold at each site (Bodilly, 1998). As supported by the "case study" descriptions of school achievement outcomes, negative achievement patterns did, in fact, appear to be associated with lower model implementation, less positive school climate, lower teacher buy-in to reform, and less engaging or academically-focused instruction.

It is also important to consider that student achievement on state-mandated standardized tests may be influenced by a variety of factors that have little to do with design implementation, such as how much a school gears its curriculum decisions to test content (Linn, 2000; Shepard, 2000). Given Co-nect's strong "social-constructivist" emphasis on project-based and cooperative learning, it could be further reasoned, in accord with Shepard's (2000) arguments, that students in Co-nect classes would be more likely to demonstrate superior learning on open-ended, performance-oriented tasks than on multiple-choice standardized tests.

These caveats notwithstanding, a liberal conclusion from our results is that even on traditional standardized tests, schools having strong implementation of Co-nect can show positive achievement outcomes relative to similar schools. A more conservative interpretation is that detracting from the positive achievement outcomes was the lack of success of two schools that shared two salient characteristics: Both had lower-quality design implementations and both served extremely high proportions of students at risk. One of these schools actually demonstrated high achievement gains several years into its program implementation, but in recent years, experienced a reversal of fortune. Whereas the lower-quality design implementation could be viewed as a cause of the low achievement in the two schools, it may also be a possible manifestation of the difficulty of effecting sustained changes in high-poverty areas, especially in a high-stakes testing environment. Whether Co-nect is less successful than other designs at sustaining reforms at such schools remains to be corroborated by further research. What is clear from this research is that, even at these very high-poverty schools, adoption of the Co-nect design was associated with improvements in school climate on varied dimensions, increases in teacher commitment and buy-in, higher usage of learner-centered teaching strategies, and greater exposure of students to the use of technology as a learning tool. Schools interested in such outcomes should view these findings on Co-nect as encouraging. However, before selecting Co-nect or comparable designs, they should also analyze carefully what strategies are needed to ensure success on both program implementation and whatever measures of student achievement stakeholder judgments and program sustainability will most depend.

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At the time that this article was completed, Memphis City Schools (on June 18, 2001) announced that all of its 165 schools would be required to discontinue im-

plementation of the 18 different CSR designs (including Co-nect) being used. The new superintendent decided on the basis of a district study that the achievement results and teacher support overall did not merit continuing the reforms or making exceptions for any particular design or individual school.

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Using a Curriculum-Based Instructional Management System to Enhance Math Achievement in Urban Schools

Jim Ysseldyke
*College of Education and Human Development
University of Minnesota, Minneapolis*

Rick Spicuzza
Minneapolis Public Schools

Stacey Kosciolk
School District of Stillwater, Minnesota

Ellen Teelucksingh
Intermediate District 287, Hopkins, Minnesota

Christopher Boys
*Department of Pediatric Neurology
Fairview-University Hospital*

Amy Lemkuil
School District of Anoka-Hennepin, Minnesota

More than two-thirds of students living in U.S. low-income urban areas have not demonstrated basic levels of math achievement. Teachers are confronted with a difficult task of meeting the needs of an increasingly academically diverse population of urban students. There is a well-confirmed knowledge base on effective instruction, but teachers need massive amounts of information for effective, sustainable improvement and data-driven decision making. The bottleneck to improving teaching and

Requests for reprints should be sent to Jim Ysseldyke, CEHD Dean's Office, University of Minnesota, 104 Burton Hall, 178 Pillsbury Drive SE, Minneapolis, MN 55409. E-mail: jim@umn.edu