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ABSTRACT

This paper describes the data sources and method used in conducting a 3-year evaluation of the Urban Systemic Initiative (USI) of the National Science Foundation in four cities. The paper also provides a discussion of two approaches to analyzing the evaluation results: structural equation modeling (SEM) and a complementary analysis of the standardized means of mathematics achievement across the years. The results of these analyses are examined as they address the question of the factors or indicators that increase student achievement and close the achievement gap more effectively. Results of SEM and Path analyses support the addition of a seventh driver, school culture, to the National Science Foundation six-drive model. Analysis of mathematics achievement of the schools in the study indicates the achievement gap has been reduced. In addition, analyses using comparison sites that are not part of the USI show that compared to relatively affluent, predominantly white schools, USI schools have made great progress in closing the cap. (Contains 3 tables, 5 figures, and 27 references.) (Author/SLD)

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Assessing the Impact of the National Science Foundation's Urban Systemic Initiative on Student Achievement: Closing the Gap in Four USI Sites

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Assessing the Impact of the National Science Foundation's Urban Systemic Initiative: The Impact of Policy on Student Achievement and Closing the Gap in Four USI Sites

Abstract

In this paper we describe the data sources and methods used in conducting our three-year evaluation of NSF's Urban Systemic Initiative in four cities, provide a discussion of two approaches to analyzing our results: structural equation modeling (SEM) and a complementary analysis of the standardized means of mathematics achievement across years, and finally, examine the results of these analyses as they address the question of what factors or indicators increase student achievement and close the achievement gap most effectively. Results of SEM and Path analysis support the addition of a seventh driver, school culture to the NSF's driver model. Analysis of mathematics achievement of the schools in our study indicates the achievement gap has been reduced. In addition, our analyses using comparison non-USI sites show that compared to relatively affluent, predominantly White schools, USI schools have made great progress in closing the gap.

The NSF Six-Driver Model of Urban Systemic Reform: The Impact of Policy on Student Achievement and Closing the Gap in Four USI Sites

Introduction

Since the early 1980's urban schools have been the target of reform, for the most part piecemeal, aimed at one or two dimensions of the schooling process. NSF's approach, in contrast to many plans preceding it, emphasizes the simultaneous application of a number of policy levers (called drivers). Additional guiding assumptions argue that all children can achieve to high academic standards and that professional development of teachers in the context of school-based learning communities is central to the reforms. To improve educational opportunities for urban students and to strengthen teaching and learning in urban schools, the strategy in question must be designed to (1) promote the academic achievement of all students and to close the achievement gap, (2) engage teachers and school principals in forging a community of learners, and (3) involve parents and stakeholder groups, or it will not be sustainable.

In this paper we will describe data sources and methods used in conducting our three-year evaluation of NSF's Urban Systemic Initiative in four cities, provide a discussion of two approaches to analyzing our results: structural equation modeling (SEM) and a complementary analysis of the reform group levels' standardized means across years, and finally, examine the results of these analyses as they address the question of what factors or indicators increase student achievement and close the achievement gap most effectively.

Related literature

Urban systems enroll more than a third of all students attending public school in the United States (www.nsf.gov). Despite past reform efforts involving urban schools, the gap in academic achievement persists between urban students and their counterparts in suburban and

rural school systems, especially in science and mathematics. The National Science Foundation's Urban Systemic Initiatives (USI) program was designed to focus on the largest cities with greatest numbers of students living in poverty. Beginning in 1993, twenty-one urban sites were granted funding from NSF in four yearly cohorts through 1996, each site receiving a five year 15 million dollar award. The ethnic and racial diversity apparent across the range of USI urban sites reflects NSF's desire to reach out to the most underserved students by providing catalytic funding to their school districts to promote increased achievement for all students in mathematics, science, and technology.

The National Science Foundation (NSF) has been critical in providing both the support and the conceptual rubric for institutionalizing systemic reforms. According to the NSF,

Systemic reform occurs when all essential features of schools and school systems are engaged and operating in concert; when policy is aligned with a clear set of goals and standards; when forthcoming improvements and innovations become intrinsic parts of the ongoing educational system for all children; and when the changes become part of the school system's operating budget (NSF, 2000).

Initially, NSF supported 25 states undertaking reform through its Statewide Systemic Initiatives program (SSI). The goal of the SSI is to assist the states in developing the capacity to move from independently devised science and mathematics educational reform measures to state-developed efforts. Coordinating such improvements as teacher preparation, the development of standards-driven instructional materials, and the assessment of student performance cover the range and scope of the SSI to date (Westat* McKenzie Consortium, 1998, October, p. 6). Although large numbers of teachers received curricular and instructional materials, and schools of education

undertook some degree of curriculum change in teacher preparation programs, these programs failed to reach those urban schoolchildren in the most difficult circumstances.

NSF established the Urban Systemic Initiatives (USI) program in 1993. Funding under the USI program was made available to urban school districts in the U.S. with the highest rates of poverty among their school-aged children according to the 1990 census. Of 28 eligible school districts, 22 successfully applied for and received a total of 15 million dollars each over a four-year period to carry out systemic reforms in math and science (Westat*McKenzie, 1998). NSF funding was considered a medium for developing, expanding, or sustaining reform through partnerships with businesses, educational institutions, and community organizations. The University of South Florida's evaluation project targeted four of the cities receiving funding under the USI: Miami, Memphis, El Paso and Chicago.

School Culture, a Seventh Driver?

School culture can be viewed as the mediating set of factors that influence the creation of social ties and relationships, and may be the critical element enhancing or curtailing effective teaching and successful student outcomes. It is increasingly seen as a critical element in supporting or defeating school reform (Fullan, 2001). Additionally, there is evidence to support the notion that students learn better when principals, teachers and others develop collaborative relationships within a professional learning community (Newman & Wehlage, 1995; Louis, Marks, & Kruse, 1996; Stein, 1998). According to Supovitz and Turner (2000), teachers who felt supported by their principal reported significantly greater use of reform approaches than did teachers who did not feel encouraged by their school leader.

The Current Crisis: Closing the Persistent Achievement Gap

While some researchers and reformers have successfully carried out enduring reform at the school level, the challenge still remains to create sustainable systemic reform across all school districts, regions and states. The achievement gap persists between the genders, as well as among ethnic group members and socioeconomic levels. Corresponding gaps are also evident in financial inequities in school funding; schools that cannot keep up with high technology in either equipment or teaching; tracking and course offerings based on more and less challenging academic content; and the challenges of high stakes testing.

So, what precisely is the crisis? It is a combination of all these things and their effects on the most important piece of the puzzle: student outcomes. The United States requires a literate, technologically savvy, mathematically proficient population capable of high-level problem solving. Students in turn require an environment in which teachers can teach the materials effectively and challenge students to think creatively while instilling appropriate knowledge and skills as a foundation for future learning.

The first issue to acknowledge is the persistent educational achievement gap between minority and non-minority students. In addition, the gap between poor and affluent students and the gender gap also persist when we consider certain achievement markers. Although these gaps are well documented in the United States, no clear conclusion has been reached to explain their persistence, while many “measures” showing disparities in cognitive abilities between groups have been discredited as valid indicators of achievement differences.

NSF-sponsored USI reform efforts attempt to reduce achievement gaps and address factors contributing to eliminating disparities in achievement. First, low performing schools often suffer from a lack of coherence among activities deemed as priorities by school district or

school-level administrators. Bryk and his colleagues (1998) in Chicago refer to these as “Christmas tree schools.” The lack of coherence includes fragmentation of the curriculum, fragmentation or lack of coordination in organizing the school day, poorly related or incompatible instructional strategies, inconsistent behavioral expectations, and the lack of a shared purpose and shared values.

Second, many schools face a poorly organized or non-existent program to support the acquisition of knowledge and skills needed to engage in effective reform at the school level. In addition, teachers and principals lack the time and resources to mobilize the information, skills and knowledge to undertake radical transformations of teaching, learning, assessment, and school organization. Third, there are major disincentives for teachers to elect to work in schools with histories of failure much less to stay with schools undergoing major shifts in practice. Developing pedagogical skills, the capacity to undertake complex organizational transformation, and the willingness to stay with a career with minimal financial rewards for the work required seems a most difficult challenge for even the most dedicated teachers and school staff.

Measures such as standardized testing, increased school accountability, community involvement, and resource allocation must be structured and evaluated in ways that relate them to achievement differentials. An increasingly important factor is the use of technology as an important part of school and work environments. When business leaders worry about applicants meeting their minimum literacy requirements and having higher level thinking skills, the question of educational efficacy come to the forefront (Mizell, 1992, p. 50). The commitment of educational leaders to increase the achievement levels of all students should be a real part of reform efforts to make certain all students are ready and able to either continue into higher education or be successful in a rapidly changing, technically demanding job market. Systemic

changes in both structure and practice are important to this goal and to the reduction of achievement differentials through increased alignment of teaching philosophy and policies with classroom practices.

Methods and Results

Description of SEM and the Indicators

Our complex array of studies and research questions allowed us to develop multiple indicators for each of the NSF drivers, to do so over a three-year period, and ultimately to execute a comprehensive analysis of multiple salient features fostering or inhibiting student attainment. In turn, these indicators informed our conceptualization of the NSF driver model including a hypothesized seventh driver. Indicators included both organizational and individual level factors such as student achievement and student engagement (Drivers 5 and 6); teachers' reports of their professional development experiences, use of technology in the classroom, involvement in decision-making processes, etc (Drivers 1 and 3); school district assessment practices and school level support structures (Driver 2); teachers' classroom practices (Driver 1); the nature of community-school partnerships and other arrangements with business and industry (Driver 4); school climate and school leadership (Driver 3 and the hypothesized Driver 7). A variety of statistical analyses were conducted using SAS, Version 8.2 (SAS Institute, 2001). Descriptive statistics, correlations, internal consistency, reliability, and path analysis were calculated. For the analyses reported here related to our Structural Equation Models and Path Analysis techniques, we computed student math achievement gains over the period of the reform (1995-1999). The gap was conceptualized in terms of both gender and race/ethnicity (Hispanic, Black, and White). Analyses reported here are for students, teachers, administrators, and documents in Miami-Dade only.

Analyses Using SEM and Path Analysis

A series of principal component analyses were conducted to determine the structure of our instrumentation and to further reduce our set of variables to a conceptually meaningful yet smaller subset. For example, the Study of the Enacted Curriculum: Survey of Classroom Practices in Mathematics and Science (SEC-T) (Blank, 2001) is a 155-item teacher survey with a companion measure for students (SEC-S) with 53 overlapping items. Our principal component analyses yielded a smaller number of factors, five altogether. Each instrument was subjected to a principal components factor analysis and items with loadings greater than 0.40 were averaged to create factor scores. A comprehensive list of components, the underlying factors, and the original items and estimates of factor reliability are presented in Table 1.

Principal Components Analysis. Components scores were generated using the factor score estimates from our analyses matched with the associated NSF driver. For example, Driver 1 in the NSF model includes standards-based instruction. As mentioned previously, we identified five salient factors from the Study of the Enacted Curriculum: Survey of Classroom Practices and scored teachers by averaging their ratings on the higher loading items. We used teacher classroom item-means to generate factor scores on the student version of the SEC. Altogether our data included student and teacher reports of classroom instructional activities, in addition to rubric scores from classroom observations, principal interviews, and school improvement plans. Finally, we computed factor scores that represented traditional teacher beliefs, standards-based teacher beliefs, aspects of school culture and student achievement. There were 52 identified factor scores, and each driver was subjected to a principal components analysis using the associated factor scores. We used these component scores to generate the correlation matrix used in the path analysis discussed below.

Path Analytic Approach Path analysis expresses regression equations in the form of causal diagrams to portray complex relationships among independent and mediating variables (e.g., stakeholders, resources, and policies) that in turn explain dependent variables (e.g., mathematics achievement and standards-based instruction) expected to impact the achievement gap in the context of systemic reform (Pedhazur, 1982). Path analysis allows us to estimate the indirect effects of policies on achievement as well as the direct effects of instruction on achievement. As discussed previously, our study involved a variety of measures yielding 17 components representing broad categories of variables of interest. In the path analysis, SAS PROC CALIS was used to determine the contribution of the exogenous variables (e.g., policy, resource, and stakeholder drivers) on the endogenous variables (e.g., standards-based instruction and achievement outcome drivers). This analysis also determined the relative contribution of the mediating standards-based instructional variables on student achievement. All paths in Figure 1 represent direct effects or the beta coefficients from multiple regression analysis. These path coefficients indicate the relative contribution of each driver. In this section we discuss the relationships among the component scores first descriptively and then followed by the results of our path analysis.

Correlations among standardized component scores (as reported in Table 2) suggest two areas for discussion. First, the component scores represent independent measures of a conceptual group or *driver*. Standards-based instruction has five components with modest inter-correlations. In this group the strongest relationship is an inverse relationship between performance projects and subject-centered class work ($r = -.24$). Other relationships are slightly positive or slightly negative and are in the 0.1 range in magnitude. Two policy-related components (instructional influences and teacher accountability) have a slight inverse relationship suggesting that the two

policy components are independent of each other ($r = -.06$). Relationships are modest yet positive among the unified resources grouping. Equity and professional development coursework were correlated ($r = .24$) and coursework and instruction were similarly correlated ($r = .21$). Strongest correlations are demonstrated for achievement gap related components (.48), while the remaining correlations were between -0.02 and 0.17 . Correlations greater in magnitude than 0.35 are significant at the $.05$ level.

Finally the correlations among component scores in different conceptual groups were somewhat mixed. Technology projects conceptual group was positively correlated with each of the unified resources' indicators including equity (.41), professional development coursework (.51), and professional development related to standards-based instruction (.34). There were strong correlations between each of the achievement gap indicators and the community stakeholder indicator. The component score related to Hispanic, White, and female students was correlated .77 with the community-stakeholder indicator while the male and Black indicator was correlated with the community-stakeholder indicator almost as strongly (.68).

The components analysis led to two models for understanding changes in student achievement as delineated in Tables 3a and 3b. In addition, Figure 1 presents a path model of student achievement gains discussed following our discussion of the six driver model. Table 3b, also discussed below, presents information on all seven drivers included in our research and shows effects on the achievement gap for male and female students. Each model was re-estimated after paths with coefficients smaller than $.05$ were removed.

Gains in Student Achievement: NSF Six Driver Model. The NSF six driver model (as shown in Table 3a) explained the association among aspects of standards based instruction (classroom instruction, technology projects, performance projects, student projects, and class

work), policy alignment (student, parent and principal views on professional development), and resources related to professional development. It explained 16.6 percent of the variability in the mathematics achievement component. This could be attributed to three of the component groups – performance projects, technology projects, and standards-based practice observed in sample classrooms. A one standard unit change in performance projects results in a .23 standard unit change in student achievement gains over the period of the reform. A one-unit change in technology projects results in a -.11 standard unit change in achievement suggesting that students of teachers who use technology in their classrooms had smaller achievement gains than those whose students were required to demonstrate their knowledge. Finally, a one unit change in observations of standards-based practice component results in a .10 standard unit change in student achievement. The process drivers had small indirect effects on student mathematics achievement gains when direct effects and total effects are examined. A one standard unit change in the process component grouping results in a fractional standard unit change in the outcome component group, student achievement gains. Direct effects were found for the policy component related to principals' view of the impact of professional development (.22), equity (-.25), time in professional development (.11) and professional development involving standards based activities (.15). The total effect of instructional influences on achievement was positive (.10) while the total effect of stakeholders/community on achievement was negative (-.09).

We also modeled through path analysis an achievement model in which the components' content was largely comprised of gains for Hispanic, White and female students (See Figure 1). This model, which explained 72.8 percent of the variability in student achievement, may be contrasted with a model whose components were related to score gains for Black and male students ($r^2=.58$). This suggests different explanations for reducing differences in student

groups. For this second model using success in reduction of the achievement gap as the outcome measure we report the following direct effects. The unit change in the technology projects component group results in a .33 standard unit change in the achievement gap. A unit change in performance projects leads to a .20 standard unit change in the achievement gap while a standard unit change in student projects results in a .10 standard unit change in the achievement gap. Finally a standard unit change in classroom observed standards based practice results in a .06 standard unit change in the achievement gap.

7 Driver Student Achievement Model. A comparable model, hypothesizing a seventh driver, school culture, as shown in Table 3b explained 19.9 percent of the variance associated with gains in student achievement. In a revision of the original NSF model, this additional process was thought to affect instruction and thus student achievement. Four instructional components of the model had path coefficients larger than .05, technology projects (-.13), performance projects (.28), student projects (.09), and classroom observations of standards based-instruction (.06). These direct effects suggest that a one standard unit change in the use of performance projects in the classroom is associated with a .28 standard unit change in achievement gains. The other instructional components (subject centered representations) had smaller and negative coefficients suggesting that these elements had small, but less undesirable effects on student achievement. The school culture components present the following changes in achievement in interpreting their path coefficients. A standard unit change in teachers' opinions (e.g., a culture of sharing, beliefs about standards) results in a .21 standard unit change in student achievement gains. Finally, a unit standard change in the remaining school culture variable summarizing vision, teamwork, facilitative leadership and learning community results, in a .08

unit change in the achievement gap. In sum, the addition of this driver adds to the explanatory power of the NSF reform model.

Analysis using Comparison Non-USI sites

We also opted to tackle the “gap issue” in another way. In addition to the multiple indicators for each school in our four participating sites used in the prior analyses, we were also fortunate to obtain access to an NCES public use data set with achievement and related data for virtually all schools in the U.S. Because USI schools draw their enrollments from predominately low-income neighborhoods with large numbers of ethnic minority residents, we selected primarily majority non-USI schools from the geographical areas closest to our sites. We defined primarily majority schools as having a student population at least 55% White. Further, we retained only those non-USI schools for which data were available the four years of interest. For Chicago, we selected 37 schools from the suburban cities surrounding Chicago, including Northbrook, Oak Park, and Oak Lawn. These inner-ring suburban sites are relatively affluent compared to central city Chicago. For El Paso, we were unable to locate enough majority schools in the immediate surrounding area. Texas is divided into 20 education regions, and El Paso is located in region 19, the western-most region of the state. We located 12 schools in region 15, which is near the center of Texas and includes the city of San Angelo, and we located 17 schools in region 20, which is southeast of region 19 and contains the city of San Antonio. In the case of Memphis, we used a proxy variable in our decision rule due to missing information on racial makeup of schools in our NCES database. We used 23 schools with 55% or less on free or reduced lunch as our cut point, and selected these schools from the Shelby County School District. While Memphis is located in Shelby county, the Memphis City School District is a

separate entity from the Shelby County School District. For Miami, we located 93 schools in Pinellas County, which is in the central western portion of the State.

As mentioned, at issue here is the analysis of the achievement gap between primarily minority and primarily majority schools. Specifically, we measured math achievement at the school level, and, in order to facilitate comparison across the districts, we standardized math achievement within district (i.e., we converted the scores to within-district Z scores).

Comparability of the resulting scores rests on the assumption that although different instruments were used, each instrument is an adequate measure of the same construct (math achievement).

In making our comparisons, we first combined across school level (i.e., elementary, middle, and high school) and completed a sort of “omnibus” comparison between our USI and non-USI Schools. This analysis is depicted in Figure 2 with 40 studied USI schools and 182 non-USI schools. Note that the dotted line represents non-studied USI schools. Because USI grants were made to participating districts, one could consider all schools in our four districts as USI schools. Thus, the dotted line represents all schools in each district less our studied USI schools. In Figure 2 we see that our studied USI schools are over one-third a standard deviation below our non-USI Schools at the baseline. However, over the four years, the USI schools close that gap to just over one tenth of a standard deviation. Our repeated measures analysis of variance yielded no main effect of time, and a borderline main effect for group (i.e., studied USI vs. non-USI) $F=3.56 (1,220)$, $p = .06$. Time by group interaction was also a borderline effect, $F = 2.15 (3,660)$, $p = .10$. Further analyses revealed that differences between groups in 1996 and 1997 were significant ($p < .05$), while the differences between the groups in 1998 and 1999 were not, indicating movement toward closing the gap. It is also reasonable to assume that there

would be differences in the gap and changes across time by school level. Let us now turn our attention to analyses at the different school levels.

Figure 3 shows comparisons between the studied USI (N=17) and non-USI (N=106) schools at the elementary level. We see a very similar pattern to Figure 2. In 1996 there is a gap of approximately one half standard deviation, which reduces each year until 1999 where it is almost zero. We also ran a repeated measures analysis of variance here. We found a main effect for group, $F = 4.03 (1,122)$, $p = .05$, but no main effect for time. Our interaction between time and group was borderline significant, $F = 2.51 (3, 366)$, $p = .07$, with further analyses revealing that the difference between the groups was significant for all years ($p < .05$) but 1999, signaling the closing of the gap.

In Figure 4 we see comparisons between studied USI (N=15) and non-USI (N=35) schools at the middle school level. While the gap does close somewhat, it appears that most of this closure is attributable to falling achievement levels recorded for non-USI schools. Additionally, the studied USI schools trend upward from 1996 to 1997, but then fall, never regaining their peak. A repeated measures analysis of variance revealed no significant effects, which may in part result from our low power and unbalanced sample sizes.

Figure 5 reveals yet a different pattern. Of interest here is the fact that, studied USI high schools begin and end above the mean (i.e., above zero). This set of results is similar to Figure 2, but with studied USI (N=8) and non-USI (N=41) schools gaining two-tenths of a standard deviation. And, again, the story is positive. The gap in 1996 is approximately two-tenths of a standard deviation and ends in 1999 at just over one-tenth of a standard deviation. A repeated measures analysis of variance revealed no significant effects, which, again may be due to our low power and our rather unbalanced sample sizes. Our analyses here portray the success of the

Urban Systemic Initiative in closing the gap. Not all findings were statistically significant, but, practically, they are very positive, representing a step in the right direction.

Discussion

The current thrust for systemic reform addresses the assumption that schools have not provided students, especially those students attending the least academically successful schools, with knowledge necessary to be successful in society – the outcome stressed by Newmann and Wehlage (1995). Students were not sufficiently challenged by the instruction they received with the result that many were ill-prepared to attend college upon graduation, enter technologically complex careers, or engage in challenging intellectual work. By setting more rigorous standards for students, the general level of student achievement would rise, better preparing students for post-secondary educational opportunities and employment (Roeber, 1999). Our overall analysis of mathematics achievement of the schools in our study indicates the achievement gap has been reduced. In addition, our analyses using comparison non-USI sites show that compared to relatively affluent, predominantly White schools, USI schools have made great progress in closing the gap. These analyses also suggest that it is difficult to sustain an upward trend in achievement at the middle school level.

Systemic reform differs from past efforts in emphasizing rigorous academic coursework for all students. In addition to improving the overall quality of education for all children, as underscored in the effective schools approach, educational equity is at the core (Kahle, 1998; Smith & O'Day, 1991; O'Day & Smith, 1993). As a result, achievement gaps are expected to decrease (Williams, 1996). Systemic reform recognizes that attempts to change one aspect of the system will require changes in other aspects at all levels of the system. However, the most important change must occur at the level of the school classroom, buttressed by policies at the

school district and state levels, especially policies focused on curriculum, instruction, and assessment. Our results add texture and complexity to our knowledge of classroom reforms, showing, for example, that factors such as technology in the classroom have a strong impact on achievement for many Hispanic and White students and may not leverage similar gains for Blacks and males. We also learned from these analyses that students whose teachers using performance projects, technology projects, and standards-based practice experience gains in math achievement. In addition, community stakeholders' involvement in schools positively affect student achievement. An obvious policy lesson here is that poorly performing schools must garner support from various constituencies to improve student outcomes. Our models indicate that another important aspect of improved student outcomes is the school culture or learning community environment. In schools where teachers view themselves as learners and believe that their students *can* achieve, improved student outcomes are likely to result.

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Table 1. Results of principal component analysis for Miami sample

Driver	Driver Name	Factor Name	Description of Factor Components	Source
Driver 1	Standards-Based Instruction			
Driver 1.1	Classroom Observation of SB Instruction	Modeling Connections and Reasoning a=.94*	Teacher observed Modeling Mathematics Connections; Guiding Mathematics Communication; Modeling Mathematics reasoning; and Guiding students in making Representations.	Standards-Based (SB) Checklist of Classroom Observations
		Connections a=.86	Teachers observed Guiding students with making Connections and using Visual connections in room.	SB Checklist of Classroom Observations
		Student Centered a=.58	Teachers observed fostering student centered communication and reasoning using Subject centered reasoning.	Analysis of Classroom Observation
		Problem Solving a=.90	Teacher observed Guiding students and Modeling problem solving (PS).	SB Checklist of Classroom Observations
		[Homework]**	Teacher gives and counts homework and the type of homework activities.	Student Survey of Classroom Practices (SCP)
Driver 1.2	Technology Projects	Use Calculators a=.86	Use calculators or computers as instructional activities; Build models or charts.	Teacher Survey of Classroom Practices (SCP)
		Doing SB Activities a=.70	Demo, presentation, or proof; Use measuring tools; Measure Objects; Analyze data for conclusions while PS; (Solve word problems from text or worksheet).***	Teacher SCP Instructional Activities
		Worksheet	Complete problems from textbooks or worksheets; Do arithmetic computations for homework.	Student SCP
		[Hands-on]*	Use hands-on materials or manipulatives such as counting blocks and algebraic tiles.	Student SCP
Driver 1.3	Performance Projects	Performance Items a=.85	Student Demonstrations; Maintaining Portfolios; Working on Projects.	Teacher SCP Assessment Practices
		SB Projects a=.91	Collect or Analyze data; solving problems; Collect or Analyze via Internet; Projects outside the classroom; Project lasting longer than a week; write a report; explain reasoning; Use graphing calculators; (Solve problems in groups).	Teacher SCP Instructional Activities
		Class Work a=.93	Do arithmetic procedures; Do computations from text or worksheet; Show steps in problem solving; Read about math (non-text); Work with hands-on materials; Work in groups; Written assignment for text or worksheet; Use hands-on materials; Write problem solving explanations; (Use computer tutorial software); (Solve novel problems).	Teacher SCP Instructional Activities
Driver 1.4	Student Projects	Student Projects	Participate in Projects outside the classroom; Project lasting longer than a week.	Student SCP
		[Subject Centered Representation] a=.42	Teacher observed using Subject and teacher centered representation.	Analysis of Classroom Observation
Driver 1.5	Subject Centered Classwork	Subject Centered a=.60	Teacher observed using Subject centered communication, problem solving, and connections.	Analysis of Classroom Observation

* Cronbach's Alpha

** Negative driver model factors are enclosed in brackets

*** Negative factor components are enclosed in parentheses

Driver	Driver Name	Factor Name	Description of Factor Components	Source
		[Classroom Activities] a=.61	Work individually in class; Estimate, predict, or guess while PS; Take tests; Work in groups to improve work; Watch teacher demonstrate PS; Use manipulatives; Collect data using hands-on materials; (Presentation about concepts or projects); (Take a test on a computer); (Use Portfolios); (Apply PS to the real world).	Teacher SCP Instructional Activities
Driver 2	Unified Policy			
Driver 2.1	Instructional Influences	Students and Parents a=.59	Meeting the needs of students and parents and preparing for the next grade.	Teacher SCP Influence
		Standards a=.86	District, state, text, or national curricula; Pre-service experience; District or state tests.	Teacher SCP Influence
		Goals and Mission a=.79	Quality of math and science goals; Measurable Assessments; Mission statement; Staff development plan.	School Improvement Plan
Driver 2.2	Accountability and Standards	Teacher Accountability a=.45	Impact of accountability; Impact of SB instruction; (Impact community resources).	Principal Interview
		Impact of USI and Standards a=.88	Impact of USI on science achievement; Impact of Standards on science instruction; (Impact resource coordination).	Principal Interview
		Impact of USI PD a=.60	Principals' rating of the impact of math and science PD and USI impact on math Achievement.	Principal Interview
		Technology a=.83	Principals' rating of USI Impact on technology and the Impact on Achievement.	Principal Interview
Driver 3	Unified Resources			
Driver 3.1	Equity	Equity a=.90	Encourage minorities and females; Teach, estimation, at assigned level, problem solving, diverse abilities, & varied cultural.	Teacher SCP Preparation
		Use S-B Practices a=.89	Meet standards; Varied assessments; Manipulatives; Adapt curricula; Integrate math with other subjects.	Teacher SCP Preparation
Driver 3.2	PD Time and Coursework	Prof. Dev. Hours a=.85	Total time spent in PD in both content and pedagogy.	Teacher SCP PD
		Math Courses a=.86	Number of Math and Math Education courses.	Teacher SCP PD
		Standards-Based Instruction a=.84	Technology; Needs of students; Journals; Multiple Assessment.	Teacher SCP PD
Driver 3.3	PD on SB Activities	SB Activities a=.77	Portfolios; Networks; New methods; Math content.	Teacher SCP PD
		Special Needs a=.81	Teach students with LEP, LD, or Physical Disabilities.	Teacher SCP Preparation
Driver 4	Stakeholders			
Driver 4.1	Community	Family a=.66	Parent & stakeholder involvement; Mobility; and attendance based on family.	Evaluation of School Improvement Plans
		Community a=.66	SIP parents; Community involvement; Belief all children can learn; School demographics; (School Partnerships).	Evaluation of School Improvement Plans
		Achievement a=.69	Increased achievement; Advanced courses; Plan to improve Math/science.	Evaluation of School Improvement Plans
Driver 5	Achievement			
Driver 5.1	Math Scores	1996 Math Achievement	Math Achievement Scores.	Math96
		1997 Math Achievement	Math Achievement Scores.	Math97
		1998 Math Achievement	Math Achievement Scores.	Math95
		1996 Math Achievement	Math Achievement Scores.	Math96
		1998 Math Achievement	Math Achievement Scores.	Math98
Driver 5.2	Math Gain	1995-97 Change	Change in Math Gain Scores.	MathDiff9597
		1995-96 Change	Change in Math Achievement Scores.	MathDiff9596
		1995-99 Change	Change in Math Achievement Scores.	MathDiff9599

Driver	Driver Name	Factor Name	Description of Factor Components	Source
Driver 6	Achievement Gap			
Driver 6.1	H-W-F	Hispanic Change	Change in Math Achievement Scores for Hispanics.	DifHmaths95-99
		White Change	Change in Math Achievement Scores for Whites.	DifWmaths95-99
		Female Change	Change in Math Achievement Scores for Females.	DifFmaths95-99
Driver 6.2	M-B	Male Change	Change in Math Achievement Scores for Males.	DifMmaths95-99
		Change	Change in Math Achievement Scores for Blacks.	DifBmaths95-99
Driver 7	School Culture			
Driver 7.1	School Culture	Vision	Faculty and staff see themselves as having a shared vision.	School Culture Quality Survey (SCQS)
		Teamwork	Working together cooperatively in an atmosphere of mutual respect and caring.	SCQS
		Facilitative Leadership	Faculty and staff view the administration of the school to be providing facilitative leadership.	SCQS
		Learning Community	Eagerly investing, learning and working together toward their shared goals.	SCQS
Driver 7.2	Teacher Opinions	Culture of Sharing	Share; Learn new things; Make decisions; Supported.	Teacher SCP Opinions
		Standards-Based Beliefs	Have curriculum materials; All students and learn; peer planning; Observe teachers.	Teacher SCP Opinions
		[Traditional Beliefs]*	Basic facts; basic skills; repeated practice.	Teacher SCP Opinions

Table 2. Correlation matrix of standardized scores

Driver Component Name and Number	Driver Component Number																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Classroom observations	1.00																
2. Technology projects	-0.17	1.00															
3. Performance projects	0.09	0.11	1.00														
4. Student projects	0.09	0.03	0.08	1.00													
Subject-centered																	
5. classwork	-0.10	0.12	-0.24	-0.08	1.00												
6. Instructional influences	-0.08	0.13	0.03	0.29	0.06	1.00											
Accountability and																	
7. standards	-0.16	0.11	0.23	0.29	-0.09	-0.06	1.00										
8. Equity	-0.05	0.41	0.37	-0.07	-0.18	0.05	0.28	1.00									
Professional																	
development and course																	
9. work	0.16	0.51	0.25	0.12	-0.07	-0.13	0.13	0.24	1.00								
Prof Dev on standards																	
10. based instruction	0.21	0.34	0.16	0.16	-0.15	-0.08	0.11	0.21	0.16	1.00							
Community																	
11. stakeholders	0.07	-0.33	0.05	0.26	-0.17	0.13	0.11	-0.16	-0.25	-0.11	1.00						
Mathematics																	
12. achievement	-0.13	0.55	0.15	-0.19	0.33	0.12	-0.29	0.29	0.19	0.12	-0.24	1.00					
Mathematics score																	
13. gains	0.13	-0.02	0.23	0.15	-0.07	0.04	0.16	-0.06	0.11	0.14	-0.06	-0.17	1.00				
Achievement gap																	
14. Hispanic, White, female	0.04	-0.09	-0.18	0.08	-0.03	0.01	-0.02	-0.18	-0.12	-0.13	0.77	0.04	-0.02	1.00			
Achievement gap male																	
15. and Black	0.09	-0.17	-0.12	0.09	-0.13	0.01	0.06	-0.26	-0.06	-0.18	0.68	-0.17	0.03	0.48	1.00		
16. School culture	-0.05	-0.25	-0.28	0.30	-0.08	0.00	0.13	-0.30	-0.15	0.05	0.00	-0.58	0.16	-0.07	-0.03	1.00	
17. Teacher opinions	0.05	0.36	0.15	-0.01	-0.03	-0.02	0.57	0.34	0.29	0.22	-0.05	-0.19	0.25	-0.04	-0.01	0.11	1.00

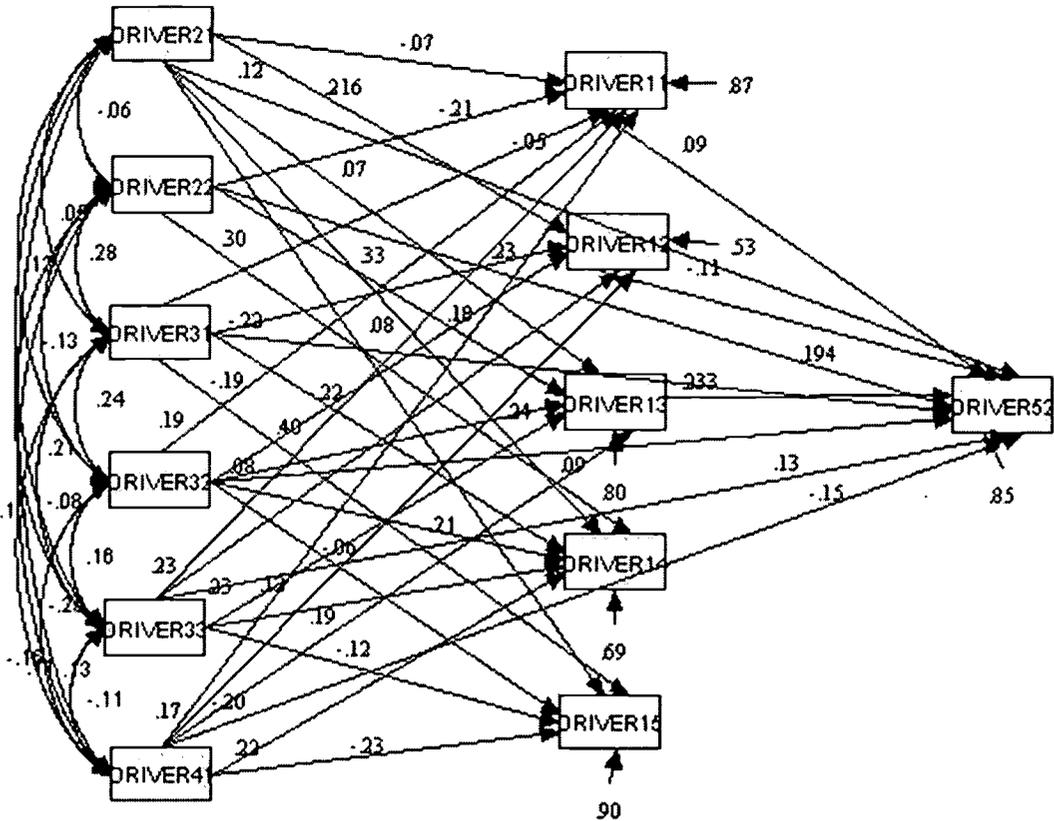
Table 3a. Six Driver Model: Total effects of exogenous variables (policy, resources, stakeholders, and instruction) on endogenous variables (achievement and instruction)

Endogenous Variables	Exogenous Variables										
	Policy		Resources		Stakeholders		Instruction		Driver14	Driver15	
	Driver21	Driver22	Driver31	Driver32	Driver33	Driver41	Driver11	Driver12	Driver13	Driver14	Driver15
	Instructional influences	Accountability and standards	Equity	Prof. Dev. time and course work	Prof Dev on standards based Activities	Community stakeholders	Classroom observations	Technology projects	Performance projects	Student projects	Subject-centered classwork
Instruction											
Classroom observations	-0.07	-0.21	-0.05	0.19	0.22	0.17	0.00	0.00	0.00	0.00	0.00
Technology projects	0.22	0.00	0.23	0.40	0.22	-0.20	0.00	0.00	0.00	0.00	0.00
Performance projects	0.07	0.18	0.00	0.24	0.12	0.09	0.00	0.00	0.00	0.00	0.00
Student projects	0.33	0.30	-0.22	0.20	0.19	0.22	0.00	0.00	0.00	0.00	0.00
Subject-centered classwork	0.08	0.00	-0.18	-0.06	-0.12	-0.23	0.00	0.00	0.00	0.00	0.00
Achievement											
Mathematics achievement	0.13	-0.37	0.26	0.15	0.07	-0.13	-0.08	0.48	0.22	-0.05	0.32
Mathematics score gains	0.10	0.22	-0.25	0.11	0.15	-0.09	0.10	-0.11	0.23	0.00	0.00
Achievement Gap											
Achievement gap Hispanic, White, female	-0.10	-0.14	0.04	0.08	-0.06	0.82	0.06	0.33	-0.20	-0.10	0.00
Achievement gap male and Black	-0.03	0.01	-0.13	0.15	-0.11	0.69	0.11	0.19	-0.15	-0.15	-0.11

Table 3b. Seven Driver Model: Total effects of exogenous variables (policy, resources, stakeholders, culture, and instruction) on endogenous variables (achievement and instruction)

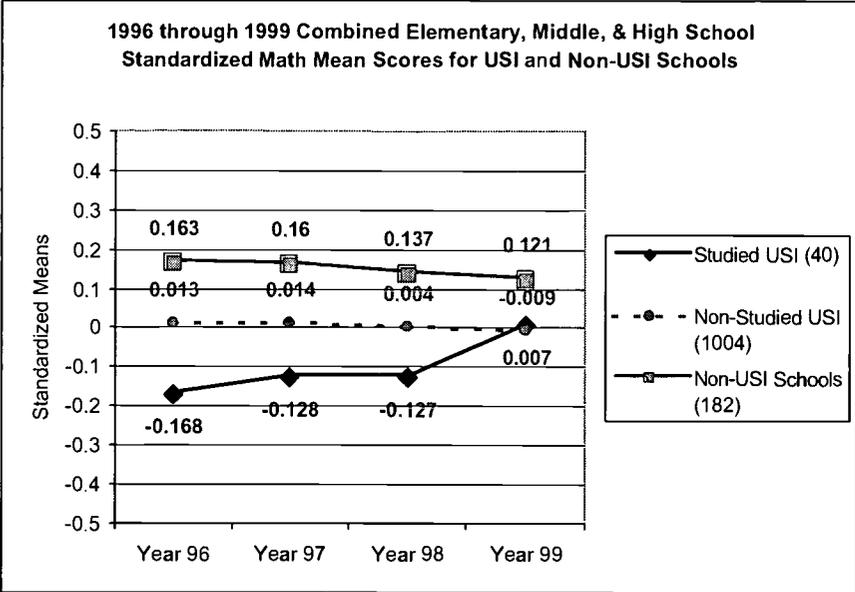
Endogenous Variables	Exogenous Variables														
	Policy			Resources			Stakeholders			Culture			Instruction		
	Driver21	Driver22	Driver31	Driver32	Driver33	Driver41	Driver71	Driver72	Driver11	Driver12	Driver13	Driver14	Driver15	Subject-centered classwork	
	Instructional influences	Accountability and standards	Equity	Prof. Dev. time and course work	Prof Dev on standards based Activities	Community stakeholders	School Culture	Teacher Opinions	Classroom observations	Technology projects	Performance projects	Student projects			
Instruction															
Driver11	-0.08	-0.29	-0.07	0.17	0.21	0.17	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	
Driver12	0.22	-0.05	0.13	0.34	0.22	-0.22	-0.19	0.22	0.00	0.00	0.00	0.00	0.00	0.00	
Driver13	0.00	0.20	0.23	0.18	0.10	0.11	-0.20	-0.09	0.00	0.00	0.00	0.00	0.00	0.00	
Driver14	0.33	0.41	-0.06	0.30	0.20	0.24	0.30	-0.37	0.00	0.00	0.00	0.00	0.00	0.00	
Driver15	0.08	0.00	-0.27	-0.11	-0.11	-0.25	-0.18	0.13	0.00	0.00	0.00	0.00	0.00	0.00	
Achievement															
Driver51	0.11	-0.17	0.16	0.12	0.13	-0.18	-0.48	-0.17	-0.07	0.46	0.11	-0.04	0.29		
Driver52	0.07	0.09	-0.18	0.05	0.11	-0.07	0.08	0.21	0.06	-0.13	0.28	0.10	-0.02		
Achievement Gap															
Driver61	-0.08	-0.13	-0.08	0.05	-0.06	0.80	-0.06	0.15	0.07	0.33	-0.21	-0.12	0.00		
Driver62	-0.03	-0.03	-0.20	0.14	-0.11	0.68	-0.03	0.11	0.11	0.19	-0.15	-0.15	-0.11		

Figure 1. Structural Equation Model of Student Achievement Gains



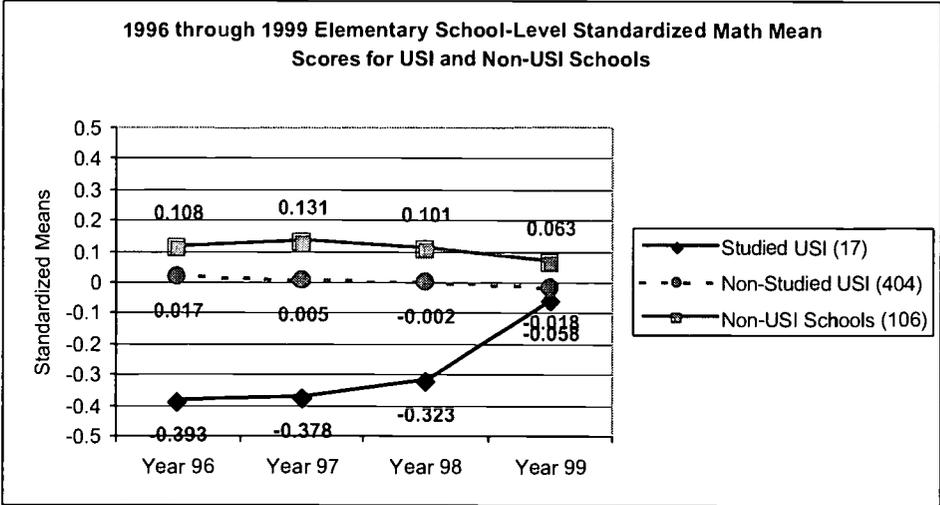
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Figure 2. Graph of Combined Elementary, Middle, and High Schools



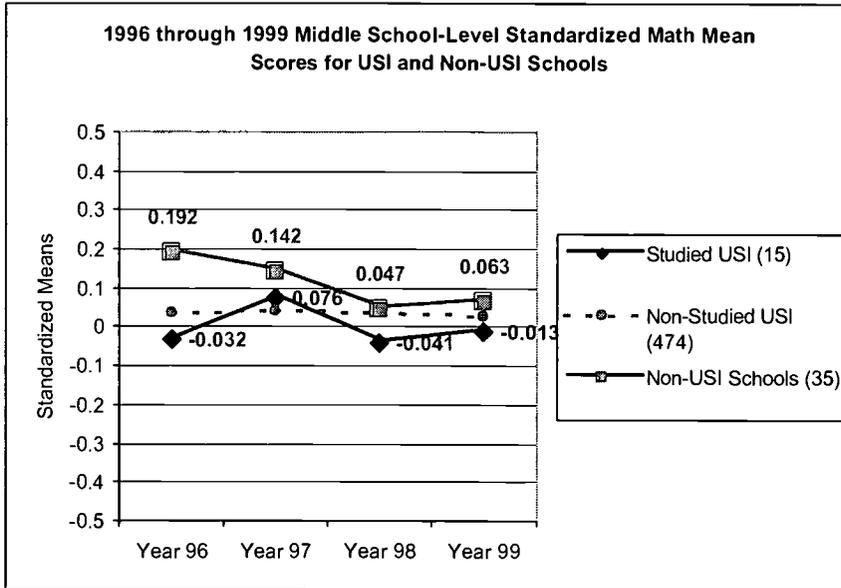
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Figure 3. Graph of Elementary Schools



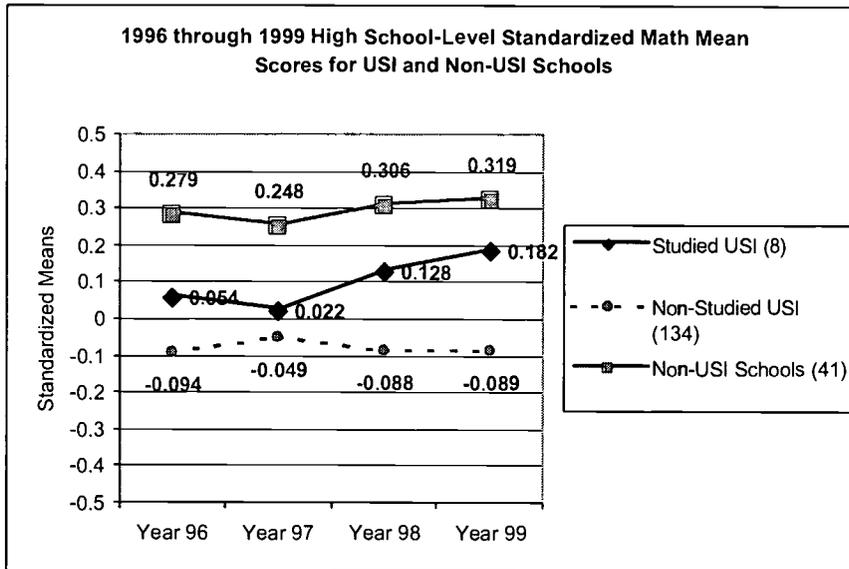
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Figure 4. Graph of Middle Schools



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Figure 5. Graph of High Schools



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Dr. Kathryn Borman

Dr. Borman is the principal investigator for the NSF Grant. She is a Professor in the Department of Anthropology and Associate Director of the David C. Anchin Center at the University of South Florida, Tampa. Her interests in the sociology of education include the transition from school to work, Appalachian migrants and the schools, and education policy. She served as the co-principal investigator for the Anchin Center's previous NSF-funded project, "Addressing National Needs for Skilled Technical Graduates." In addition to carrying out research in connection with the current NSF initiative, Dr. Borman teaches classes in qualitative research methods and anthropology and education. Her interests center on the school to work transition, gender equity in work and work places, and systemic reform in education. She currently serves as editor of the AERA journal, *Review of Educational Research (RER)*.

Dr. Bill Katzenmeyer

Dr. Katzenmeyer is a professor in the department of Measurement and Research, College of Education, University of South Florida. He has a wide range of experience in education and views his personal mission as participating with teachers and school administrators in the dual tasks of "Improving the Schools of Today and Inventing the Schools of Tomorrow". After sixteen years as Dean of the College of Education, Dr. Katzenmeyer currently serves as Dean Emeritus and Director of the David C. Anchin Center for the advancement of teaching. He developed the School Culture Survey that measures teachers' responses to school leadership, staff cooperation and other features of their schools. This survey is part of the methodology for the NSF Grant.

Reginald Lee, M.A.

Reginald Lee is a research associate at the David C. Anchin Center and a doctoral candidate in the Department of Educational Measurement & Research in the College of Education at the University of South Florida. His main areas of research have focused on minority student misrepresentation in special education and appropriate methodological approaches to evaluating under and over representation of African American students in specialized programs in public schools. Mr. Lee is currently working on two NSF funded projects studying the impact of systemic reform on mathematics and science achievement in urban schools.

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