Improving Learning for All Students through Equity-Based Inclusive Reform Practices:

Effectiveness of a Fully Integrated Schoolwide Model on Student Reading and Math

Achievement

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Abstract

The present investigation examines the Schoolwide Applications Model (SAM) as a potentially effective school reform model for increasing equity-based inclusive education practices while at the same time enhancing student reading and math achievement for all students. A three year quasi-experimental comparison group analysis using Latent Growth Modeling (LGM) was employed with seven urban elementary or elementary/middle schools and seven matched comparison schools in the same district. Results suggest significantly larger growth for experimental school students in math and no statistically significant difference in reading score growth between experimental and comparison schools. However, reading score growth for experimental schools was statistically significant in a post hoc analysis of selected schools. Additional descriptive analysis is presented for three schools that implemented the model with the highest measured fidelity; these schools made improvements on both reading and math scores while those of matching comparison schools decreased.

Keywords: inclusion, equity, school reform

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Although IDEA policies reflect movement toward inclusive education, in practice, many schools are reluctant to move all students, particularly those with the most extensive support needs, into general education classrooms (McLeskey, Landers, Williamson, & Hoppey, 2012; O'Rourke, 2015; Ryndak, Jackson, & White, 2013). Practitioners find inclusive education models to be challenging for several reasons. The primary argument against inclusion reflects a philosophy of protectiveness and shelter for students with disabilities and stresses the need for concentrating specialized supports in a single location (Kauffman, 2004). A secondary argument expresses concern about directing educational resources and instructional time primarily toward students with disabilities, thereby reducing the quality of instruction provided to students without disabilities (Kauffman, Landrum, Mock, Sayeski, & Sayeski, 2005).

A substantial body of research on inclusive educational practices does not support these common critiques. Reviews of the literature comparing segregated and inclusive educational arrangements on indicators of student achievement generally favor inclusive education for both students with and without disabilities (Cole, Waldron, & Majid, 2004; Cosier, Causton-Theoharis, & Theoharis, 2013; Jackson, Ryndak, & Wehmeyer, 2010; Kurth & Mastergeorge, 2010; McLeskey, Waldron, & Redd, 2014; Ruijs, Van der Veen, & Peetsma, 2010; Rea, McLaughlin, & Walther-Thomas, 2002; Sailor, Wolf, Choi, & Roger, 2009; Sermier Dessemontet & Bless, 2013).

In spite of these reported successes, "the sticking points to inclusion still appear to be: Who takes responsibility for the students who struggle academically and socially?; the labeling

of 'included' students, the reorganization of classrooms to include all students; the types of

curricular approaches that are most effective for those with additional needs; and the role of

special educators" (O'Rourke, 2015, p. 537). In answer to these concerns, O'Rourke (2015)

pointed to an equity-based model, the Schoolwide Applications Model (SAM)[11] (Sailor & Roger,

2005) "that is flexible, cohesive, and responsive," that requires "a new way of viewing the

education of students with disability, and indeed all students," and would "herald a change in

regular schools from inflexible programs that have often denied students with additional needs

success" (p. 541). A few other contemporary models support this broader definition of inclusion

focused on equity for all students, including those reported by Booth and Ainscow (2011),

Kozleski and Artiles (2012), and Waldron and McLeskey (2010).

Schoolwide Applications Model

SAM is unique from traditional inclusive models in at least three ways. First, SAM was

conceived as an equity-based approach to providing inclusive education (Sailor & Roger, 2005).

Equity-based inclusive educational environments offer an alternative to placement-based

definitions of inclusion and work to increase academic achievement for *all* students while

simultaneously providing students with disabilities access to general education classrooms and

integrated environments and curriculum through deployment of a multi-tiered system of support

and embedded response to intervention (MTSS/RTI). Yet, equity-based inclusive education does

not mean teaching all students the same way, but instead relies on instructional modifications,

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[1] SAMSchools, LLC, the authors and technical assistance providers for the Schoolwide
Applications Model (SAM) ceased operations in 2014. SWIFT Center, a U.S. Department of
Education, Office of Special Education Programs National K-8 technical assistance center
includes and expands upon much of SAM in the broader framework known as Schoolwide
Integrated Framework for Transformation (SWIFT).

differentiation, and supplemental supports and services that allow full membership of all students in grade-level classrooms and participation in all general education curriculum activities.

Second, SAM is focused on increasing academic achievement by fully integrating fragmented educational resources, supports and services for the benefit of *all* students, not solely those receiving special education services. Schools implementing SAM subscribe to a collaborative, data-driven, standards-based educational program providing all students with the learning support they need to be successful in general education, regardless of disability classification or severity of need. SAM authors theorized, and evidence suggests, that when certain transformational processes take place in a school during a three to five year period, academic achievement scores rise for all students (Meisenheimer, Hinman, Darnold, & Margo, 2014; Sailor & Roger, 2005, 2007; Sailor, Zuna, Choi, Thomas, McCart, & Roger, 2006).

Finally, SAM incorporates district-level structural features to support school-level implementation. Other models implement inclusive practice within a school, but lack a broader system support (Booth & Ainscow, 2011; McLeskey et al., 2014). Research suggests when a district is the *point of intervention*, schoolwide transformation and improved student outcomes become sustainable after incremental technical assistance resources are gone (SISEP, 2014). Schools implementing SAM receive district support to promote sustainability and scale-up of inclusive practices. Districts collaborate with schools to provide training and technical assistance to school-level educators, allocate resources to support transformation, and respond to policy barriers that inhibit inclusion.

Schoolwide Applications Model Guiding Principles

To help schools create an equity-based culture that enhances academic achievement for all students and is supported by districts, SAM authors articulated six guiding principles of

implementation, each with a body of supporting evidence. These principles are: (a) general education guides all instruction, (b) all school resources are configured to benefit all students, (c) schools proactively address social development and behavior, (d) schools are organizationally data-driven, problem-solving systems, (e) schools have open boundaries in relation to their families and communities, and (f) schools enjoy district support for undertaking extensive systems change.

General education guides all instruction. SAM's general education principle is fundamental to an equity-based inclusive education. In SAM schools "all students with IEPs are members of age-appropriate, grade-level classrooms, and they attend all non-classroom functions with their classmates" (Sailor & Roger, 2005, p. 507). Grade-level general education teachers are primarily responsible for all students, regardless of any student's specialized support needs. Specialists (e.g., speech language pathologists, occupational therapists) work in cooperation with general and special educators to provide intervention and support to any student who can benefit. Small group and individualized instruction are available to support the general education curriculum and are offered to any student. Students are not referred for placement in special schools or segregated in specialized classrooms unless a strong parental preference is expressed.

Resource configuration. The goal of this guiding principle is to reorganize school resources so that all students receive the services and supports they need to be successful. An obstacle to this goal is a traditional "siloization" of educational departments, creating division of school funding, resources, and services among various classification groups (Artiles, Kozleski, Dorn, & Christensen, 2006; Fuchs, Fuchs, & Stecker, 2010; Sailor et al., 2009). Research suggests educational improvements accrue from combining all school resources, including special education, Title I and English learning, for the benefit of all students (Sailor et al., 2009).

Social/behavioral development. SAM schools were assisted to incorporate research-based, effective practices to improve outcomes for students who struggle to learn. The schools employed a comprehensive behavior support intervention, School-wide Positive Behavior Interventions and Support (SWPBIS). SWPBIS was originally developed to instruct students in special education who have behavioral disabilities (Carr, Dunlap, Horner et al., 2002), and later extended to meet the social/developmental needs of all students (Sailor et al., 2009). Research suggests that SWPBIS reduces the rate of office disciplinary referrals and can increase academic test scores of all students (Bradshaw, Mitchell, & Leaf, 2010; Horner et al., 2009).

Data-driven problem-solving. SAM emphasized simultaneous top-down and bottom-up support by connecting district staff, school leaders (e.g., Principal and leadership team), and educators in reform activities in team-based problem-solving system. In such a system, various student data are collected and analyzed, which enables teaching staff to make decisions about their own school reform priorities and activities. All school personnel participate in teaching and learning for all students. Categorical services and supports (e.g., special education, Title I, English learning) are considered to be temporary resources in a fully integrated system of supports and services designed to provide an instructional match for individual students needs. This approach is for all educators and staff sharing their resources and talents to instruct all students regardless of a student's presenting problem (i.e., traditional categories).

Family engagement through partnerships. The goal this SAM principle is to go beyond traditional parent/teacher organizations to actively engage families in formal partnerships with school personnel. Researchers recommend actively involving families in student learning to increase student achievement (Ingram, Wolfe, & Lieberman, 2007; Jeynes, 2005; Sheldon, 2003) and promote sustainable school reform (Bryk, Sebring, Allensworth, Luppescu, & Easton,

2010; Payne, 2008). Research also suggests that trust built between families and school personnel positively influences student outcomes (Tschannen-Moran & Hoy, 2000). SAM schools foster trust by facilitating open boundaries with their families and empowering parents to actively participate as members of school teams and other planning and instructional processes.

District-level support. Finally, district level structural features are essential to aid in full implementation with fidelity and sustainability of SAM reform efforts. Schoolwide transformation and improved student outcomes have been shown to sustain over time with district support (Boyd, Kerchner, & Blyth, 2008; Copland, 2003; Payne, 2008; SISEP, 2014). Districts play a key role in creating a vision for change, providing relevant professional development, updating policy to support reform efforts, and providing enough time for reform efforts to develop (Payne, 2008; Sailor, 2009). SAM guiding principle six notes the importance of garnering district-level support prior to initiating change at the school level. District teams that manage resource allocation and examine and adjust policies are vital to the success of SAM implementation.

Purpose

The purpose of this study was to extend and strengthen the evidence for schoolwide inclusive school reform models, of which SAM was one. To do so, we not only evaluated student achievement growth in SAM schools, but also evaluated growth in relation to a matched control group of non-implementing schools in the same district from 2009 through 2012. Our overarching hypothesis was: Implementing SAM will increase schoolwide student achievement in reading and math for all students. The measurement for reading and math, the annual grade-level standardized assessment, included all subgroup students who took the tests. A three year quasi-experimental comparison group analysis using Latent Growth Modeling (LGM) was

employed to test this hypothesis. In addition, a post-hoc descriptive analysis of student

achievement in the schools that fully implemented the model with the highest fidelity is

provided.

Method

Participants

Setting/location. This study is a longitudinal investigation of a single schoolwide

inclusive school reform model implemented in multiple schools located in a low-income, large

inner-city area, that is, the District of Columbia Public Schools (DCPS). Seven elementary or

elementary/middle schools participated as implementation sites, and seven schools as

comparison (i.e., control) sites. Failure to meet national academic proficiency standards

contributed to DCPS's decision to implement inclusive school reform. As of 2010, 75% of

DCPS schools failed to meet annual adequate yearly progress targets for at least two consecutive

years and were in federally mandated school improvement status (District of Columbia Office of

the Chancellor, 2010).

Sampling procedures. To choose implementation sites, DCPS officials sent a letter to

all their elementary Principals to identify those with interest in implementing a school reform.

Several volunteered and district officials initially chose eight schools to implement the model.

One school was selected because of its direct involvement in a legal dispute involving persistent

segregation of students receiving special education services. The other seven were chosen

because they were among the lowest performing schools in the district. Ultimately, one school

opted to defer its participation until the next year, leaving seven implementation sites for this

study cohort.

We purposively selected comparison schools to match each of the district selected

implementation school's size (total students enrolled) and student demographics (percent of

students in each ethnic background, status of socio economically disadvantaged, special

education service, and English language instruction) (See Table 1). Implementation and

comparison group each had five schools serving pre-K to 5th grade students and two schools

serving pre-K to 8th grade students. More than 85% of curriculum and instructional materials in

both groups were aligned to each other and with the district core standard. Comparison group

schools were not exposed to SAM technical assistance materials and activities such as

professional development, on-site meetings, or consultations.

Outcome Measures

We obtained Institutional Review Board (IRB) approval from our university and

informed consent from DCPS for use of data describing schoolwide and subgroup student

academic performance in all fourteen schools. We used the SAM Analysis System (SAMAN) as

a measure of fidelity of implementation for interpreting results.

Measures of academic performance. Secondary data obtained from DCPS's annual

grade-level standardized test data on reading and math represented academic performance.

Students from 3rd to 8th grade complete these assessments for reading and math during each

year. The total sample included most students in the special education subgroup; and all but

about 1% of students with IEPs took the DCPS standard assessment. The DCPS assessment

system, DC-CAS, met established technical adequacy standards according to published reports.

Across grade and content area assessments, reliabilities for the assessment average 0.92 for the

stratified alpha. Average stratified alpha for reading assessments was 0.93, and was 0.93 for

math (District of Columbia Office of the State Superintendent of Education, 2011). Reliability

coefficients greater than or equal to 0.8 are considered acceptable.

Schoolwide Applications Model Analysis System (SAMAN). Trained assessors

collected primary data to examine the fidelity of model implementation using SAMAN (Sailor &

Roger, 2008). SAMAN assesses installation and implementation of critical features of SAM

within a school across time. The instrument contains a Likert-scaled set of 15 items (i.e., critical

features) developed from the previously described SAM guiding principles. Each of the 15

critical features is evaluated using a scale from 0 to 3, where 0 reflects essentially no

manifestation of the feature at the school and 3 represents full implementation (Sailor et al.,

2006).

SAMAN is designed to be administered twice a year. Here baseline administration

occurred a month after a School Centered Planning (SCP) session, and subsequent

administrations followed at about six-month intervals (Sailor & Roger, 2008). SAMAN

assessors were independent contractors, trained by the researchers, but with no stake in the

outcomes of the assessments. Preliminary psychometric evaluation of this tool reported an

80% average inter-rater agreement between any two independent assessors from a total of six sets

of observations. For internal consistency, a Cronbach's alpha for all 15 items was .95, which

indicated that overall internal consistency of SAMAN was strong and exceeded the general

cutoff for research purposes (Henson, 2001). Cronbach's alphas of each subscale ranged from

.80 to .91, which were also above the research purpose alpha level. Analyses revealed a strong

correlation between each item and corresponding subscale. The r_{ss} score range was from .81 to

.95 indicating strong correlation for internal consistency. Correlations between each item and

overall total score (r_{tot}) were also above the recommended correlation level for research purposes

(Nunnally, 1975). Convergent validity could not be studied because no similar tool was

available; however, SAMAN item #7 scores (i.e., active, schoolwide positive behavior support

program) were compared with Schoolwide Evaluation Tool (SET; Sugai, Lewis-Palmer, Todd, &

Horner, 2001) scores to provide evidence that scores from the two measures were closely related.

Pearson correlation analysis showed significant positive relationship between SET and SAMAN

item #7 ($M = 1.58$, $SD = .86$, $N = 53$, $r (51) = .78$, $p < .01$) (Choi, 2007). Overall, preliminary

technical adequacy evidence suggests that SAMAN was a valid and reliable assessment to

measure SAM fidelity of implementation.

Administration of SAMAN involves gathering information from multiple sources,

including a review of document products, observations and staff interviews, to assess the current

status of implementation of the model. SAMAN assessors spent an entire day in each school for

each assessment, conducting interviews with administrators, Site Leadership Team members,

teachers, staff members, families, community representatives, and SAM district coordinators;

and reviewing documents such as school meeting minutes, policies, training, and class schedules

(Sailor & Roger, 2008). Since the SAMAN instrument was designed to be used to measure the

fidelity of SAM implementation, it was administered only in the implementation schools.

Intervention Procedures

SAM implementation occurred in five stages over three years. The first stage was an

introduction to SAM, which was initiated through the district and included Principals from each

school. Activities focused on potential challenges of supporting students with more extensive

needs in the general education curriculum. The second stage was baseline administration of

SAMAN and discussions with school leaders about their schools' scores. The third stage, in

which a Site Leadership Team consisting of representatives of school personnel (e.g.,

representatives of grade level teams, behavior support team, multi-tiered system of support team,

and so on), family members, and community representatives was established in each school. The

teams set up a reform process called School Centered Planning, wherein schools engage in collaborative problem solving and host occasional events for community participation. Teams set timelines for implementation of the SAM with a focus on success as determined by a significant change in SAMAN scores. The expectation was that schools would begin to show improvement by the end of Year 3 if the critical features were implemented. Stage four was Principals and teacher leaders discussing how resources within the school might be used differently to support students. Alternative use of general and special educators to support the needs of students was key to this discussion. Stage five included extensive professional development for each school and the associated professional learning communities within each school. SAM professional development began with a focus on MTSS (schoolwide) with RTI (special education identification), including schoolwide PBIS.

Year 2 professional development activities stressed academics with attention to understanding the need for flexible grouping of students based on available data, and tg differentiating instruction for each group while using the existing curriculum. Trained instructional coaches also enhanced DCPS's capacity to use their academic curriculum more effectively. The training used a basic coaching framework, including classroom management, content, instruction, and formative assessment for learning (Knight, 2007). Professional learning also was provided for collaborative problem solving approaches involving a school leadership team or educators and coaches using the instructional coaching cycle (i.e,. identify, learn, and improve with data). Coaches provided model lessons, observed educator lessons with co-constructed observation forms, discussed results, and explored data with educators to provide proactive supports. In addition to the foundational work of inclusive education, academic MTSS/RTI components were carefully reviewed and refined. Using Dynamic Indicators of

Basic Early Literacy Skills as a universal screener and progress monitoring tool, data-based

decision systems were refined to create clear entry and exit rules for Tier 2 and Tier 3

interventions and monitor overall effectiveness of intervention practices with aggregate data as

well as individual student's progress monitoring. Although research-based math screening and

progress monitoring tools were not available, DCPS's benchmark assessment and teacher-

created progress monitoring assessments were actively used for decisions about supplemental

interventions and supports for math. Each school leadership team was trained and guided to use

data, especially aggregate data for a specific subject topic, grade level or subgroup of students, to

monitor overall effectiveness and fidelity of Tier 2 and 3 interventions and the schoolwide

system. These data informed the support given educators through professional development,

coaching, and technical assistance (TA), to improve specific areas. Thus, a continuous educator

support system through the instructional coaching and data-based decision-making systems

helped to establish a strong academic MTSS foundation. SAM action plans incorporated the

other critical features as well and progress was monitored with SAMAN fidelity of

implementation reviews and student outcome data.

In Year 3, SAM implementation was intensely focused on coaching district personal and

school leadership teams to improve instruction and to strengthen family and community

partnerships. This focus was evident in professional development within the district and ongoing

modifications to resource utilization within the schools. TA activities included two-day

professional learning opportunities every semester, on a bi-monthly schedule for coaches and

quarterly for school leadership teams. Annual professional learning institutes included coaches,

administrators and teachers; they covered such topics as MTSS/RTI, parent engagement,

universal design for learning and inclusive educational practices. Schools received direct TA on

inclusive practices, particularly for students with the most extensive support needs. TA visits

occurred quarterly and on an as needed basis. All TA activities were supported by school SAM

coaches, who were, in turn, supported by a district-level SAM coordinator. This coordinator

provided weekly training sessions and resources.

Research Design & Data Analysis

We chose a three year, quasi-experimental comparison group analysis because of the

needs-based, non-random sampling procedure of implementation schools, and the purposive

selection of matched comparison schools. Reading and math scores were analyzed with Latent

Growth Modeling (LGM) using AMOS software (Arbuckle, 2006). LGM provided a better

method than repeated measures ANOVA because the unit of analysis was schools with students

moving from grade-to-grade and school-to-school through the study period. LGM is a

longitudinal growth model using Structural Equation Modeling (SEM) methodology (Duncan,

Duncan, & Stryker, 2006), which can assess the rate of outcome changes (i.e., latent slope

growth factor). In comparison with traditional statistical approaches, LGM has the ability to

evaluate its model fit and selection of criteria (i.e., adequacy of a model), accounts for

measurement error by using latent repeated measures, and effectively handles missing data. In

the present analysis, LGM was applied to examine the mean outcome change in reading and

math during a specific time period (2009-10 to 2011-12 school year), and SAM implementation

predictability on reading and math scores. Using all available data we imputed missing data

through maximum likelihood estimation. The full information maximum likelihood (FIML) is

an effective method to handle missing data, showing more accurate model rejection rates and

higher efficiency (Enders & Bandalos, 2001).

Separate LGM analyses were conducted to examine whether growth of reading or math

scores in implementation schools were significantly larger than the scores of control group

schools (i.e., significant mean slope and significant positive effect of SAM implementation status

on reading or math growth). Additional post-hoc LGM analysis was planned to investigate the

significance of reading and math score growth within implementation schools, regardless of

outcomes from the comparison school study.

       Full implementation with fidelity criteria. The differences in academic achievement

between fully implementing SAM schools and other SAM schools were examined through post-

hoc descriptive analysis. Full implementation with fidelity is determined by established criteria:

a minimum of two years of SAMAN assessment and average scores across all 15 features and

each individual feature between 2.5 to 3.0. For the present analysis, SAMAN scores of 0 to 3 on

each of the 15 features were averaged to produce a total scale score. Schools scoring below 1.5

on SAMAN total scale score fell in what was arbitrarily termed the *initiation* phase and generally

reflected schools beginning to understand the SAM school reforms and how they align with its

unique characteristics. SAMAN total scale scores between 1.5 and 2.5 reflected schools in the

partial implementation phase of SAM, signifying the acceptance of new structural and

instructional ideas and progress toward refining SAM processes through action planning.

Schools scoring 2.5 to 3.0 reflected the full implementation of SAM and its guiding principles in

the daily operations of the school with sufficient fidelity. Previous research with SAM

implementation in a West Coast urban district indicated a school could be expected to reach this

stage with appropriate district support in three or four years with TA provided by consultants to

the district (Sailor et al., 2009).

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Results

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Fidelity of SAM Implementation

Fidelity of implementation can be a significant factor in evaluation of an intervention's strength (Hulleman & Cordray, 2009). As such, the indicator of adherence to SAM implementation procedures, that is, SAMAN data, enabled descriptive investigation of effects for those schools that implemented with fidelity. Examination of total mean SAMAN score at baseline and for every subsequent semester showed that all seven SAM schools made consistent progress. Figure 1 depicts each implementation school's SAMAN total mean score improvement. The average total SAMAN score of implementation schools was 1.8 out of 3 (60%) in 2009-10 and increased to 2.4 (79%) in 2011-12. All implementation schools made progress from 2009-10 and the average difference between 2009-10 and 2011-12 scores was 0.57 (19%). SAMAN scores increased in all SAM schools across all critical features.

These results, as will be more fully discussed later, indicate that SAM implementation improved equity and quality education by:

- increasing inclusion of students with special needs in the schools (Critical Feature [CF]#1 $M = 1.0$, $SD = 0.58$ to $M = 2.71$, $SD = 0.49$)

- providing flexible, non-categorical supports to meet diverse needs of students (CF#11 $M = 0.86$, $SD = 0.38$ to $M = 2.29$, $SD = 0.76$)

- engaging all school personnel in training; valuing their contributions to student academic and social outcomes (CF #10 $M = 1.57$, $SD = 0.53$ to $M = 2.71$, $SD = 1.14$).

In addition to these largest increases were two features that increased by 1.0: full student participation in supported instruction (i.e., peer mediated instruction, CF #9 $M = 1.43$, $SD = 0.53$ to $M = 2.43$, $SD = 0.53$) and community partnership with service providers and business (CF #14 $M = 1.71$, $SD = 0.76$ to $M = 2.71$, $SD = 0.49$).

Schools' collaborative team process improvements signaled movement toward a team-driven learning organization with shared leadership and decentralized data-based decision-making processes. Data-driven, collaborative, decision making, learning organization guided by team processes (CF #8) and established Site Leadership Team empowered by the school and the district (CF #12) were two of three items on average that exceeded the full implementation status after just a year of implementation.

Table 2 shows rank-ordered average scores after the 3-year implementation. The highest ranked features were school's acceptance of all students regardless of level of support need (CF #1), team process (CF #8), whole staff participation in teaching/learning (CF #10), and partnership with community business and service providers (CF #14).   The strong site leadership team empowered by the school and district (CF #12) and district supports (CF #15) were second ranked features.

SAM Efficacy: Student Academic Achievement

To examine the relationship between the math or reading score growth and SAM implementation, we entered as a covariate an implementation condition (i.e., SAM or comparison school) that allowed for testing the effects of the intervention on intercept and slope factors. If SAM implementation can predict higher score changes or slope intercept on math scores, the covariate should significantly impact slope or intercept.

Math. Figure 2 illustrates the LGM analysis results for math with 7,574 students in all 14 schools (i.e., seven SAM implementation schools and seven comparison schools). In the model, observed variables MathSY0910, MathSY1011, and MathSY1112 represent math scores in 2009-10, 2010-11, and 2011-12. Latent variable ICEPT and SLOPE represent the intercept and slope of score change over three years. Dev ICEP and Dev Slope represent the standard

deviation of intercept and slope.

LGM analysis provided the following model fit indices, CFI (comparative fit index) = .996, RMSEA (root mean squared error of approximation) = .036, and the chi-square test statistic, X^2 (1, N = 7574) = 10.93, $p < .01$. These results indicate an adequate fit of the model to the data (Browne & Cudeck, 1993). The RMSEA fit index also reflects the power of the LGM analysis, which is the probability that the growth model will be rejected when it is not correct. MacCallum, Browne, and Sugawara (1996) reported a power calculation method with the RMSEA fit index, and suggested that values of RMSEA could be involved in choosing null and alternative hypotheses, which would be, respectively, exact fit ($\varepsilon_0 = 0.0$) and mediocre fit ($\varepsilon_0 = 0.08$). Thus, in the current analysis, the RMSEA has enough power and adequate model fit.

The mean intercept value (Mi) of 48.5 indicated that the average starting score was 48.54 unit, $Mi = 48.5$, $t = 112.2$, $p < .01$ (standardized coefficient: 0.43). The model revealed a significant mean slope, $Ms = 2.4$, $t = 5.2$, $p < .01$ (standardized coefficient: 0.45), suggesting a growth model with a steady increase in the math scores from 2009-10 to 2011-12. The Ms value of 2.36 can be interpreted as the increase in math per unit of time. The correlation between intercept and slope was .25 and significant, $p < .01$. This result suggests that higher scores on initial status in math had a greater increase on the slope factor. The intercept variance for math (DevICEPT) $Di = 16.5$, $t = 57.6$, $p < .01$, and the variance of the latent slope scores (DevSlope) $Ds = -10.2$, $t = -4.3$, $p < .01$, indicated substantial variation in individual differences regarding the initial status and trajectories of change in math over time.

The implementation condition had a significant effect at intercept and slope of math scores. SAM implementation affected slope positively, $\beta = 1.2$, $t = 1.96$, $p = .05$ (standardized coefficient: 0.63), which means that students in SAM schools made higher math score growth

over the three years compared to comparison group students. The impact of SAM

implementation on intercept was also significant, $\beta = 2.5$, $t = 4.2$, $p < .01$ (standardized

coefficient: 0.60), which may be interpreted to mean that implementation schools had higher

initial math scores. Figure 3 shows implementation and comparison schools' math score

changes.

Reading. The same LGM analysis was repeated to examine SAM implementation

effects on reading. The LGM model, however, failed to produce a statistically significant SAM

effect on the slope when analyzed with comparison schools. The model yielded a chi-square

statistic of X^2 (1, N = 7574) = 9.1, $p < .01$, fit indices of CFI = .997, and RMSEA = .03, which is

an acceptable fit of the model to the data. In this model, although the covariate for SAM

implementation positively affected slope, the results were not significant, $M_s = 0.19$, $t = 0.45$, $p =$

.64 (standardized coefficient: 0.43). Another LGM analysis was conducted to examine growth of

reading scores of only the seven implementation schools over three years. A total of 3,719

students' data were analyzed; Figure 3 shows implementation and comparison schools' reading

score changes and Figure 2 shows the LGM diagram and results.

Values for various model fit indices, comparative fit index (CFI) = .99, RMSEA = .24,

and chi-square test, $X^2 = 12.3$, indicated an adequate fit of model to the data. In this model, the

slope was statistically significant, $M_s = 2.5$, $t = 5.8$, $p < .01$ (standardized coefficient: 0.43),

showing a steady increase of reading scores from 2009-10 to 2011-12 . This result indicates that

the seven implementation schools' reading scores increased 2.5 per year from 49.2 (intercept

value). The correlation between intercept and slope was -13.2, which was negative but not

statistically significant. This statistic indicated that increases on reading scores were made

regardless of initial status in reading. These LGM results provide clear evidence of reading score

improvement for all seven implementation schools but not significantly different from the
comparison schools.

Student achievement for full implementation schools and their comparison schools.
Although the LGM analysis did not reveal a significant statistical difference in reading score
changes between implementation and comparison schools, the visual trend of the reading score
changes showed that the SAM schools indeed improved for the three schools that achieved full
implementation status of all 15 SAMAN features.

Figure 3 shows math and reading score changes for both full implementation schools and
matched comparison schools. Math scores of full implementation SAM schools increased
consistently from 2009-10 ($M = 45.6$, $SD = 15.4$) to 2011-12 ($M = 50.3$, $SD = 14.1$), while scores
of comparison schools continuously decreased from 48.0 ($SD = 17.1$) to 45.0 ($SD = 17.7$) during
the three-year period. This result exactly reflects the LGM analysis of math scores with all SAM
schools and comparison schools.

**Reading and math score trends for full implementation SAM schools and their
comparison schools.** Figure 3 also shows a positive change for reading of 4.7 from 2009-10 ($M
= 45.4$, $SD = 15.7$) to 2011-12 ($M = 46.1$, $SD = 15.2$). In contrast, comparison schools' scores
decreased over the project period. Three comparison schools' reading scores were almost the
same as full implementation SAM schools in 2009-10 ($M = 45.5$, $SD = 16.1$) but lower than
SAM schools in 2011-12 ($M = 44.2$, $SD = 15.3$). These results indicate that SAM full
implementation with fidelity in these three schools had a positive relationship with reading
scores on the state assessment as well as math scores, although the reading score difference was
not statistically significant.

<div align="center">

Discussion

</div>

We examined the effectiveness of SAM on students' academic performance in reading and math. As a systematic approach to school reform that is grounded in equity-based inclusive education and MTSS/RTI, SAM implementation positively affected the growth of student academic performance. When we compared state assessment scores in SAM schools with those in comparison group schools in the same school district, SAM had a statistically significant effect on the math score growth for three implementation years. Although the relationship of SAM to reading score growth was not statistically significant, consistent reading score improvement was observed among the seven SAM schools. Reading score trends differed remarkably between the three SAM schools that achieved full implementation with fidelity, which were improving, and the matching comparison schools, which had decreasing scores.

The statistically significant student performance change was not fully expected within the three year implementation period because educational change and performance improvement usually take more time as educators struggle to understand new activities mandated by the reform and to develop new knowledge and skills (Fullan, 2001). School reform requires time to engage in professional development, collaborate with other educators, reach consensus about core school decisions, evaluate and monitor, reflect on what is working and what are current needs, and so on. Our results suggest the same conclusion, but with a different route to the school reform outcome.

We did not examine the relationship between progress in the implementation of SAM and academic performance through statistical analysis; however, some findings suggest that student performance can be predicted by SAM implementation status. Student performance of the three full implementation schools showed more growth than the other implementation schools; and the gap between SAM and matched comparison schools became larger when SAM schools achieved

full implementation with fidelity.

Limitations

A number of limitations may pose challenges to our interpretation of the findings. First, the use of purposively rather than randomly selected schools within the same school district prevented us from drawing firm conclusions that SAM provides effective inclusive practices in urban pre-K to 8th grade schools. Comparison group schools were a convenience sample selected to match the characteristics of implementation schools within the same school district. Since SAM implementation includes some capacity building efforts within a district, the possibility exists that systematic approaches and supports learned by administrators from SAM implementation schools affected other schools within the district.

Second, all the data for the current investigation came from the same school district. This limited diversity in the sample prohibits conclusions that the findings generalize to other school districts and states; however the pattern of growth obtained in the DCPS SAM schools reflected a similar pattern of a West Coast urban district (Sailor et al., 2009). Consequently, for the first and second limitations, further research is needed to include schools in diverse contexts (i.e., urban/rural; large/small enrollments; charter/public) with randomized or quasi-randomized implementation and control groups. Future research may also need to consider a district as a unit of implementation and compare schools in implementation districts with ones in control group districts for a clearer understanding of the model's effectiveness.

Another limitation of the current study is that the SAMAN preliminary, unpublished evidence of technical adequacy was sufficient for our fidelity of implementation purposes; however, the relationship between SAM implementation status and student achievement could not be examined because SAMAN's psychometric properties have not yet been fully explored

and peer reviewed. For example, we could not evaluate the relative contribution of each of the

SAM critical features measured by the SAMAN tool to student outcomes. Nevertheless, the

present study was intended to be a "sledgehammer look" at student-level outcomes associated

with a multicomponent intervention implemented over time. Future research with schoolwide

inclusive reform models may need to examine the relative contribution of different systemic

intervention components and their benefits on behavior or academic outcomes with various

student variables.

Further, space limitations prevented a detailed analysis of achievement gap results

applied to the special education subgroup, a population of particular interest to readers of this

journal, and will be the subject of a future paper. As a quick overview, the descriptive analysis

results revealed that the average DC-CAS math scores of students with IEPs in the three

enculturated SAM implementation schools continuously increased from 32.4 ($SD = 13.9$) in

2009-10 to 38.6 ($SD = 14.5$) in 2011-12, while the ones from matching comparison schools

decreased from 34.5 ($SD = 15.4$) to 31.3 ($SD = 18.0$). Meanwhile, average proportion of time in

general education settings for students with IEPs in the implementation schools increased from

32.6% in 2010-11 to 65.0% in 2011-12. The 32.4% increase in time spent in general education

setting was a bigger increase than matching comparison schools, which was a 29.1% increase

(35.4% in 2010-11 and 64.6% in 2011-12). The inclusive education environment in the three full

implementation SAM schools showed an even great increase with average proportion of time

rising from 20.0% in 2010-11 to 80.7% in 2011-12.

Finally, additional measurements and analyses are needed in future research to detect

pedagogical changes that occur with schoolwide inclusive reform and their mediating

relationship with student achievement. Although SAM included strong supports for instructional

improvement required with the changes accruing to inclusive education, we did not measure

actual teacher behavior changes. Pedagogical changes will provide more information to

understand how integrated, inclusive school practices can change instruction and improve

student performance.

Conclusion

SAM has been shown to potentially be an effective schoolwide inclusive reform model

for increasing equity-based inclusive education practices and enhanced student achievement for

all students in urban elementary and elementary/middle schools. Understanding how inclusive

education improves a school is a critical question for schools since inclusive education is not

only for students with disabilities, but also for all students with diverse learning needs and

cultural backgrounds. Bearing in mind the limitations described above, findings in this

investigation indicate that this approach to inclusive education may benefit all students by

improving student academic performance, which supports previous research investigating effects

of inclusive education on all students (Cole et al., 2004; Sailor et al., 2009; Sailor et al., 2006).

These results from urban elementary and elementary/middle schools provide potential insights

into disability, socio-economic status, race, and other culture-related achievement disparities in

the future. Although the current study focused on overall improvement of academic

performance, SAM was designed to create a positive, inclusive school culture supported by

evidence-based practices for behavior and academic instruction, strong leadership, family and

community engagement, and district supports.

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Table 1

Demographics for Schoolwide Application Model (SAM) Implementation and Comparison Schools

School	Enrolled students	Ethnicity African American	White	Asian	Hispanic	Multi-racial	Free-reduce meals %	English learners %	Special education %
SAM implementation schools									
A	356	100%	0%	0%	0%	0%	89%	0%	12%
B	400	48%	3%	0%	49%	0%	74%	32%	11%
C	373	100%	0%	0%	0%	0%	71%	0%	18%
D	293	100%	0%	0%	0%	0%	86%	0%	14%
E	520	16%	63%	10%	6%	4%	13%	14%	6%
F	413	96%	0%	1%	3%	0%	84%	5%	12%
G	391	99%	0%	0%	1%	0%	85%	0%	9%
Comparison schools									
H	272	99%	0%	0%	1%	0%	87%	14%	1%
I	563	30%	2%	1%	66%	1%	80%	55%	9%
J	350	98%	0%	0%	1%	1%	67%	0%	7%
K	309	97%	0%	0%	2%	1%	84%	0%	11%
L	324	14%	58%	7%	14%	7%	14%	30%	4%
M	463	97%	1%	0%	2%	0%	83%	1%	14%
N	191	98%	1%	0%	2%	0%	84%	2%	15%

Table 2

Ranked Average Critical Feature Scores: SAM Implementation Schools, Spring 2012

Rank	Critical Features	Mean
1	CF1. All students are served at the school in which they would be served if they had no need for special services or supports.	2.71
	CF8. The school is a data-driven, collaborative, decision-making, learning organization with all major functions guided by team processes.	
	CF10. All personnel at the school participate in the teaching/learning process and are valued for their respective contributions to pupil academic and social outcomes.	
	CF14. School has working partnership with its community business and service providers.	
2	CF12. School has established a Site Leadership Team empowered by the school and the district to implement SAM at the school.	2.57
	CF15. SAM implementation at the school site is fully recognized and supported by the district.	
3	CF7. The school has an active, school-wide positive behavior support (SWPBS) program.	2.43
	CF9. School effectively incorporates general education students in the instructional process.	
4	CF11. School personnel use a uniform, non-categorical lexicon to describe both personnel and teaching/learning functions.	2.29
	CF4. School is inclusive of all students for all school functions.	
5	CF3. General education teachers assume primary responsibility for all students at the school.	2.14
	CF6. All students are taught in accordance with the general curriculum with accommodations, adaptation supports, and services as needed.	
6	CF2. All students at school are considered general education students.	2.00
	CF5. School is organized to provide all specialized support, adaptations and accommodations to students in such a way as to maximize the number of	

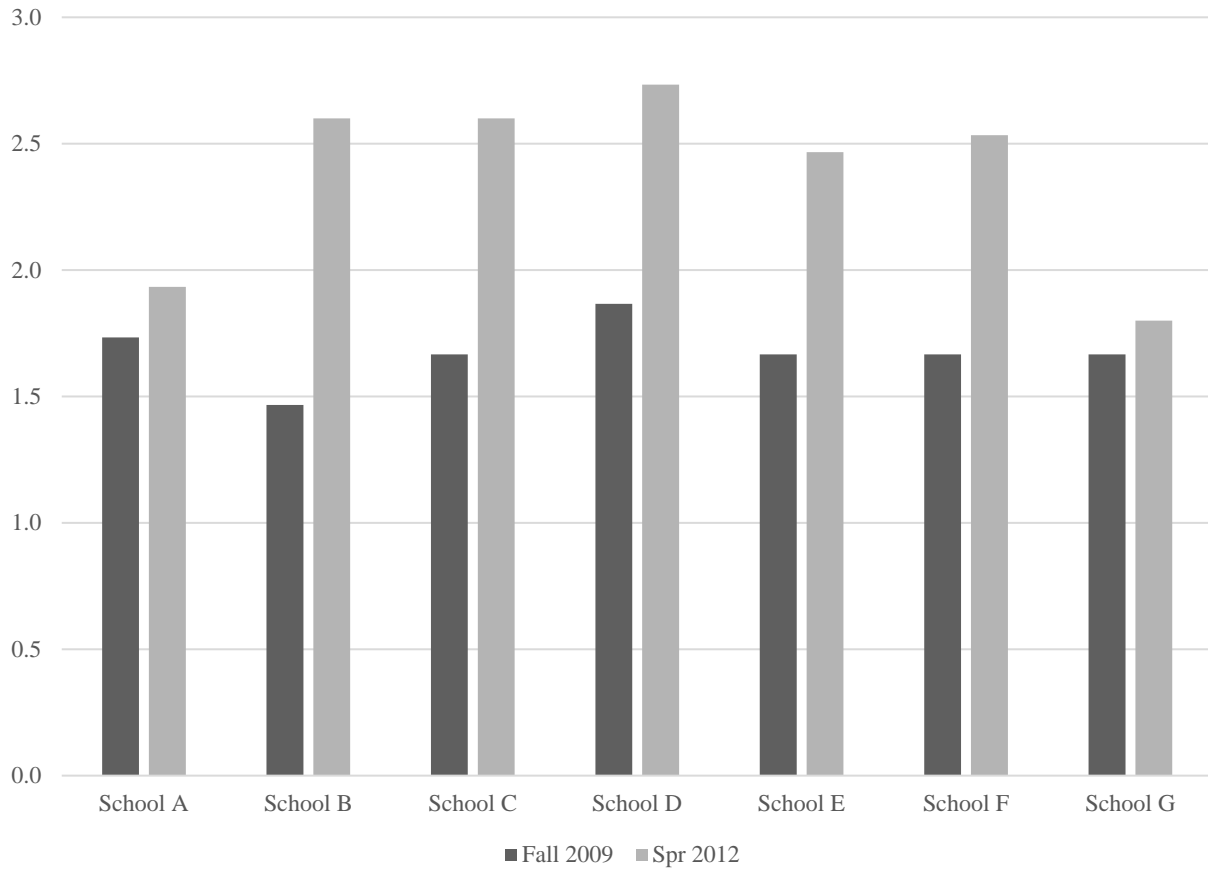| Rank	Critical Features	Mean
	students who will benefit.	
	CF13. School has working partnership with families of students who attend the school.	

Figure 1. SAMAN total mean score improvements between the baseline (i.e., fall 2009) and
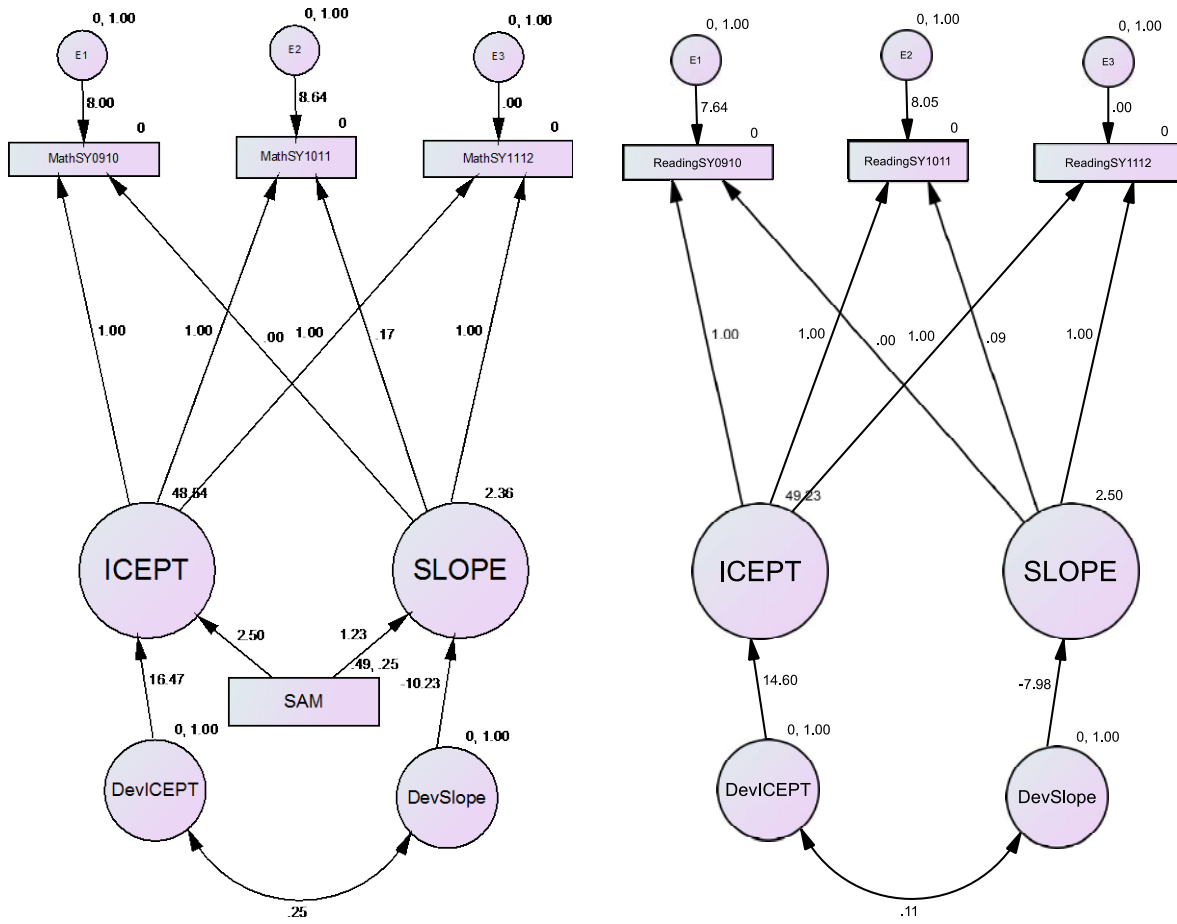
spring 2012 in seven SAM implementation schools.

Figure 2. Schematic of latent growth model analysis for the SAM implementation impact on math score (left) and reading score (right).
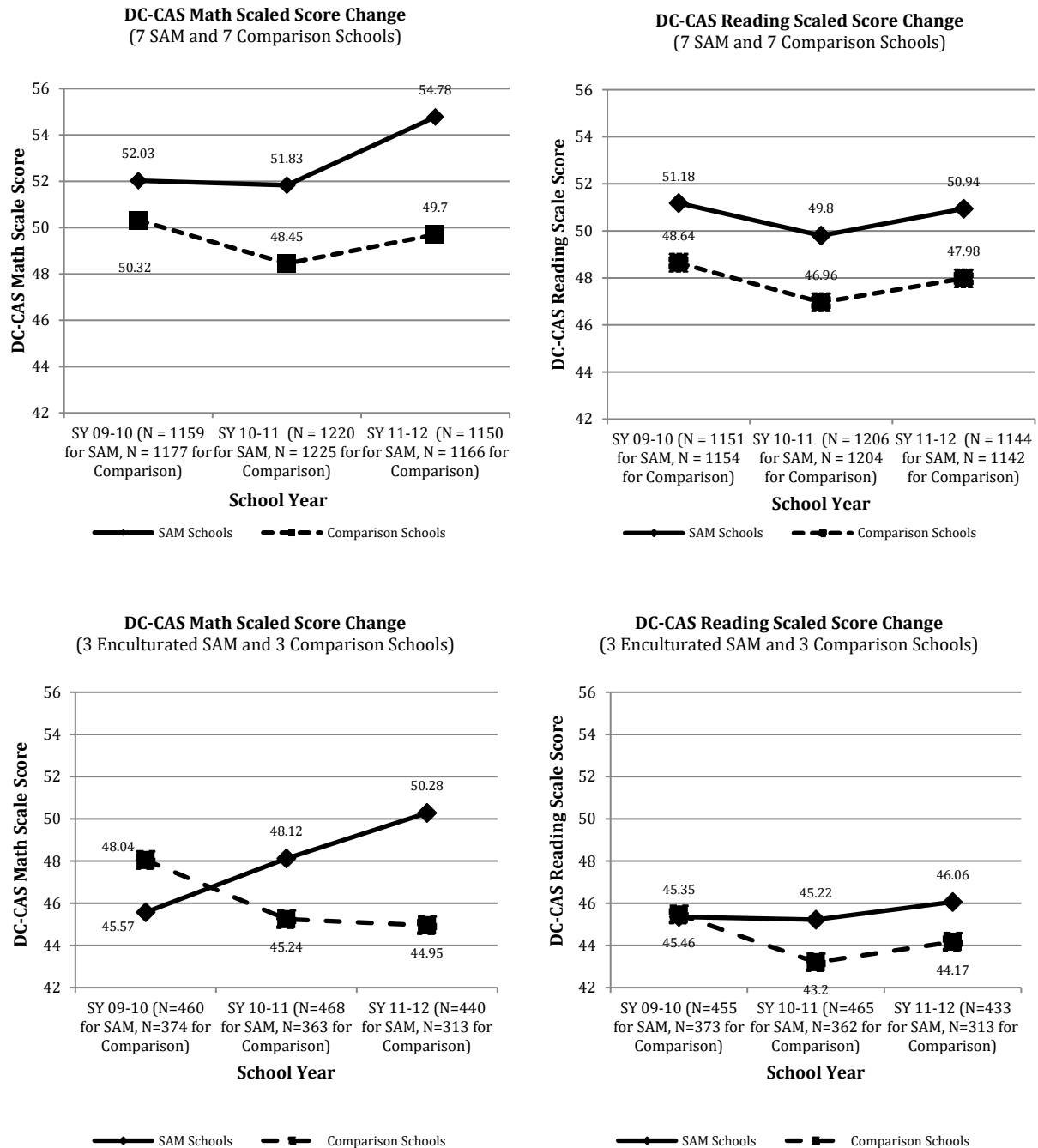
DC-CAS Math Scaled Score Change
(7 SAM and 7 Comparison Schools)

DC-CAS Reading Scaled Score Change
(7 SAM and 7 Comparison Schools)

DC-CAS Math Scaled Score Change
(3 Enculturated SAM and 3 Comparison Schools)

DC-CAS Reading Scaled Score Change
(3 Enculturated SAM and 3 Comparison Schools)

Figure 3. District of Columbia state assessment math and reading score changes for all SAM

implementation and comparison schools (above) and *3* SAM schools with fidelity of

implementation and corresponding comparison schools (below).