

The Talent Development Middle Grades Model: A Design for Improving Early Adolescents'
Developmental Trajectories in High-Poverty Schools

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The Rise of Comprehensive School Reform Models

For more than 40 years, the U.S. government has made various attempts to spur improvements in the education received by students living in poverty. For example, the Title I program was started in 1965 to provide a revenue stream for schools serving high percentages of economically disadvantaged students so that the schools might provide targeted compensatory educational services to these students. Evaluations of Title I during the seventies and eighties showed only small, short-term program impacts on student achievement except in the rare schools where the targeted educational services for eligible students funded by Title I -- such as individual pull-outs -- were carefully orchestrated to cohere with and support a regular education program of solid curriculum and instruction (For a review, see Rowan & Guthrie, 1989).

Fortunately, important changes in the Title I legislation in 1988 made it possible for high-poverty schools – in which 75% or more of the students are living in poverty -- to opt for “schoolwide models” of Title I service delivery that blend Title I funds and personnel with the school’s other funds and personnel in order implement whole-school reforms that seek to improve, coordinate, and integrate the school’s compensatory and regular education instructional programs for all students (Rowan, Barnes, & Camburn, 2004). The hope was for high-poverty schools to develop or adopt more comprehensive (and less fragmentary) models for instructional improvement that would stimulate an integrated and strategic set of schoolwide reforms to all key aspects of the school’s educational program including curriculum, instruction, organization, professional development, and parent involvement (Desimone, 2002; Wong & Meyer, 1998).

The nation’s interest in comprehensive school reform was further heightened by the founding of the New American Schools (NAS) Development Corporation in 1991 which

solicited contributions from businesses and foundations and then awarded grants to fund the development of 11 “break the mold” designs for whole-school reform (Berends, Bodilly, & Kirby, 2002). Meanwhile, grants from the U.S. Department of Education and from major foundations supported the creation of several additional comprehensive school reform models, including a federal educational research and development center grant that made it possible for the Center for the Social Organization of Schools at Johns Hopkins University to launch the Talent Development Middle Grades Model in 1994 (see next section). Congress’s enthusiasm for whole-school reform was further demonstrated by changes in 1994 in Title I legislation to allow majority-poverty schools (50% or more of the students live in poverty) to join high-poverty schools in using Title I funds to engage in comprehensive reform. As a result of all these investments in comprehensive reform, by 1997, there were more than 9,000 schools using Title I funds to support whole-school reforms (Wang, Wong, & Kim, 1999).

Massive growth in the number of schools adopting whole-school reform models was spurred by Congress’s enactment of the Comprehensive School Reform (CSR) program that provided additional money to the states to support schools that adopted such models. With this program’s funds, states invested \$35 million in CSR in 1998, \$136 million in 1999, \$157 million in 2000; \$225 million in 2001, and over \$265 million a year in 2002, 2003, and 2004. The program was gradually discontinued starting in 2005 with the program’s awards to schools dropping to \$211 million in 2005; \$65 million in 2006; only \$5 million in 2007 (U.S. Department of Education, 2007b). However, a significant number of schools continue to adopt or sustain CSR models nationally using Title I, school, or district funds, or using funding provided by their state or by a foundation.

The founders of the NAS initiative initially sought to bring comprehensive reforms to a broad spectrum of the nation's public schools (Glennan, 1998). However, because the bulk of the federal CSR program funding stream was reserved for schools that served majority-poverty or high-poverty student populations, these types of schools were ultimately much more likely than schools serving more economically-advantaged student populations to adopt a whole school reform model. The average poverty rate of a school receiving at least 1 year of CSR funding was 82%. (U.S. Department of Education, 2007c) and these schools were mainly located in urban (60%) and rural (28%) areas (U.S. Department of Education 2007a).

Although twice as many elementary schools as middle schools received CSR funding, there was a growing realization during this time period that the comprehensive reform of elementary schools by itself was not enough to ensure the success of students from high poverty neighborhoods because inadequate schooling during the middle grades was having a profound negative impact on their future prospects. Far too many of these students do not receive high-quality learning opportunities, expert teaching, and supportive learning environments during the middle grades (Balfanz, 2000; Corbett & Wilson, 1997; Juvonen, Le, Kaganoff, Augustine, & Constant, 2004; Wilson & Corbett, 2001). In response, many of these middle grades students become disengaged from school (Balfanz, Herzog, & Mac Iver, 2007; Skinner, Zimmer-Gembek, & Connell, 1998) and their educational achievement levels fall even further behind those of their agemates elsewhere (Balfanz & Byrnes, 2006, Beaton et al., 1996; Hanushek & Rivkin, 2006; Schmidt et al., 1999). The challenge for those seeking to reform high-poverty middle-grades schools is to successfully institute reforms that are comprehensive enough to alter the developmental trajectories of these students in ways that increase their odds of attaining the key milestones that many students from middle and upper class backgrounds routinely

accomplish: graduating from high school, entering college, and finding a career that pays a living wage.

Generating and Elaborating a CSR Model for High-Poverty Middle Schools

The Center for Social Organization of Schools (CSOS) established Johns Hopkins University's Talent Development Middle Grades (TDMG) Program in 1994 to develop a comprehensive whole-school reform model that would enable schools serving high poverty populations to improve students' developmental trajectories. The curriculum and technical assistance provided by the Program is designed to assist schools to successfully offer high-level classes to all students, provide all teachers with the support and professional development they need to develop deep content knowledge, abandon the pedagogy of poverty (Haberman, 1991), and achieve good teaching that engages students as active and reflective learners in heterogeneous groups that are continually asked to apply their learning to problems of everyday life. Douglas Mac Iver and his colleagues gathered together a multi-disciplinary team of experienced middle school educators, research scientists, teacher coaches, professional and organizational development specialists, and curriculum writers to work with high-poverty middle grades schools in developing and refining the TDMG Model (Mac Iver, Ruby, Balfanz & Byrnes, 2003; Balfanz, Ruby, & Mac Iver, 2002) and to assist these schools in implementing the model and in assessing its impacts on students and teachers.

Schools that embrace the model are assisted to:

1. adopt a "no-excuses" credo: a belief that all students can succeed with a standards-based curriculum and that it is the collective responsibility of the adults and students in the school to overcome obstacles to this success (Wilson & Corbett, 2001);

2. implement an evidence-based, standards-based instructional program in literacy, mathematics, and science (Mac Iver et al., 2004; Mac Iver & Mac Iver, 2007; Ruby, 2006; Senk & Thompson, 2003);
3. implement, if they desire, U.S. History (CSOS, 2004) and History of Science (Garriott & Teter, 2007; Teter, Garriott, & Brodowski, in press) instructional programs based upon the two award winning series, *A History of US* and *The Science Story* (Hakim 1999, 2004, 2005).
4. institutionalize multiple tiers of support for teachers that provide them with sustained and focused professional development (Balfanz, Ruby, & Mac Iver, 2002; Cohen & Hill, 2001; Killion, 1999);
5. provide extra help in reading and mathematics to struggling students during regular school hours (Mac Iver et al. 2001; Ruby & Balfanz, 2006; Ruby 2007a, 2007b);
6. improve school climate and school-family-community partnerships (Epstein et al., 2002);
7. create communally-organized *structures for caring* (Darling-Hammond, 1997) that give teachers the opportunity to work with a smaller group of students over a longer period of time.

TDMG's Facilitated Instructional Programs

A team of TDMG curriculum coaches in math, reading/English language arts (RELA), science, and history is assigned to each school. Each curriculum coach assists the school in selecting among TDMG-supported curricular offerings in the subject area of his or her expertise to construct a coherent, standards-based instructional program. Each coach then provides high-quality monthly grade-specific professional development sessions that model upcoming activities from the curriculum, develop teachers' content knowledge, demonstrate effective instructional approaches, and provide an opportunity for teachers to engage in collaborative reflective practice. The coaches also provide ongoing in-classroom assistance to teachers that includes peer coaching, team teaching, trouble shooting, and offering advice and encouragement.

TDMG's Schoolwide Adolescent Literacy Program

Perhaps the biggest challenge faced by middle schools serving high-poverty students is to help their students progress beyond elementary literacy skills and develop proficient reading, writing, communication, and language skills that enable them to learn, pursue postsecondary education, make informed career decisions, contribute to society, and advocate for themselves and others. TDMG began developing Student Team Literature (STL) in 1995 to meet this challenge by teaching effective reading strategies, extending comprehension skills, and developing fluency in reading and writing.

STL (Jones, 1998) is a systematic cooperative learning approach that provides students with explicit instruction in comprehending literature while building their reading fluency and knowledge of the writer's craft. The approach includes teaching pre-, during-, and after-reading strategies to assist students in constructing and extending meaning and emphasizes vocabulary and literary analysis along with writing, critical thinking, and social skills needed for cooperative

learning (Beers, 2008; Mac Iver, et al., 2004; Stevens, 2006a). The approach pairs TDMG *Discussion Guides* with high-quality, high-interest, culturally relevant trade books selected by the school's RELA faculty in consultation with their TDMG curriculum coach. Guides are available for over 200 classic and contemporary works of adolescent fiction and nonfiction at a wide variety of reading levels. The guides assist teachers and students as they systematically read and reflect upon themes and topics presented in the literature, and on aspects of "the writer's craft." The guides are used during a cycle of instruction that includes direct teaching and modeling; partner practice, analysis, and discussion; and individual assessment, reflection, and extension activities. The cycle is designed for optimal use during a daily 90-minute period but can be adjusted for shorter periods.

Each book is broken into four or five sections, with each section being the focus of instruction for about one week. Before beginning a section, students learn key vocabulary needed to understand the reading. The teacher pronounces and the students repeat these words, and they work together to identify roots and affixes, build definitions, and use the words in meaningful sentences, sentences in which context clues are embedded to signal students' understanding of the denotative and connotative meanings of new vocabulary. Throughout the week, rapid reviews of vocabulary are carried out. If students have trouble with recognizing words or figuring out what they mean, these reviews include help on word recognition skills (Beers, 2003) and vocabulary development strategies (Allen, 1999).

Then, the teacher activates students' prior knowledge regarding the book's content (see Beers, 2003, pp. 73-101). At the beginning of the book, this can be achieved by class discussion of the book's topic, the possible meaning of the book's title, and predictions regarding how the vocabulary words may fit in with the characters, setting and action. Later on, after sections of

the book have been read, students apply their prior knowledge to making predictions as to what will happen in the next section.

After being introduced to both the vocabulary and topic of the book section, students read the section silently. Silent reading allows students to focus on comprehension and not be distracted by the extra demands involved in oral reading such as achieving appropriate pronunciation, expression, pacing, and volume. Furthermore, the ability to read silently with comprehension is an essential skill that students need in order to thrive in school and in most post-academic careers (RAND Reading Study Group, 2002; Routman, 1998). Nevertheless, silent reading in an STL classroom is often followed by partner reading of the same section or excerpts from it. During partner reading, less able readers and their more able counterparts take turns reading paragraphs aloud to teach other to build fluency. Partner reading gives poor readers and second language learners additional practice, and it gives all students an opportunity to deepen their comprehension and prepare for the guided discussion of the reading that will follow. Unlike round robin reading (in which *one* student at a time reads aloud to the whole class), partner reading gives students greater incentive to pay attention because each student has only to wait for his partner to read before he gets another turn. All students are taught social skills, such as when and how to correct someone who has made a mistake, to ensure that partner reading goes smoothly. During partner reading, the teacher circulates among pairs to identify problems with fluency that may require the use of additional in-class strategies such as choral or echo reading, or extra help out of class in the Savvy Readers Lab (described later).

The partners (or sometimes, for variety, teams of four) then discuss the reading using questions and graphic organizers from the Guide. Next, they write individual responses to those questions including a justified prediction of what will happen next. Then the students continue

to deepen their understanding of the book they are studying through 1) meaningful sentence-writing, 2) a mini-lesson on a specific literary element or device that the author has used, 3) writing in response to a prompt to show understanding of the text and to make connections between the text and students' own experiences, 4) extension research or projects that explore issues and themes in the literature, and 5) peer pre-assessment in preparation for individual assessments. Guided whole-class discussions are interspersed with these activities in order to draw out and check students' understanding.

Upon completion of a section, students take a comprehension test to assess their understanding of the book so far, a vocabulary pronunciation test, and a word mastery test requiring them to write meaningful sentences for high-frequency words that appear on their vocabulary lists, words that are valuable to have in one's working vocabulary for future use. These end-of-section tests are included in the teachers' edition of each TDMG *Discussion Guide*. In addition, for many books, an end-of-book unit test is available to assess students' overall understanding of the content and vocabulary in the reading. These unit tests take the form of typical standardized reading comprehension and vocabulary tests used in schools. They help students prepare for such tests -- while checking their understanding of the reading -- without having to abandon daily instruction to engage in disconnected test preparation activities.

STL classrooms also feature periodic Listening Comprehension (LC) and Talent Development Writing lessons. During LC lessons, teachers read aloud so that students can hear a fluent reader read- and think-aloud, and so that students can practice their own comprehension and listening skills, and learn about key literary devices used by writers of the trade books they are reading. The teacher reads from a work different from the book being read by the class, usually literature written for younger children chosen for its literary richness and relative brevity.

Before reading, the teacher introduces the literary element or device to be illustrated. While reading, the teacher pauses to “think aloud” about what was read (in order to model comprehension strategies) and to ask comprehension questions. Afterward, the teacher holds a class discussion on the literary device, often using a graphic organizer to record student responses.

The writing lessons and activities provide systematic instruction and inspiration for planning, writing, editing, revising, and publishing. Teacher modeling is a key part of these lessons: teachers stand before their students and show them how to approach a writing assignment, as opposed to simply telling them what steps they should take. Students observe as the teacher thinks aloud as she goes through the writing process and the teacher considers his or her audience. This gives students a chance to see how mature writers write and to learn new concepts and techniques by example. The lessons also include springboard activities such as role-playing, sensory exercises and simulations that engage students in the assignment prior to writing and provide them with first-hand experiences, giving them a better understanding of the subject and audience of the assignment. Depending upon the skills and knowledge needed to complete a given assignment, targeted mini-lessons help students develop appropriate usage, mechanics, and style. Throughout the writing process, students work in cooperative learning groups that provide them with a caring audience who helps them focus and polish their writing. While groups are meeting, the teacher confers with individual students, discussing and analyzing their writing.

For ease of use, all the materials necessary to carry out STL instruction (such as silent reading, partner reading, partner discussion, prediction, writing prompts, and assessments) are bundled into the Discussion Guides. The teachers’ editions contain additional information for the

teacher including: 1) a summary of the reading, 2) recommendations for preparing students to read a particular book, 3) questions that lead students to establish expectations regarding what they will read, 4) whole-class discussion questions that build upon prior partner and team discussions, and 5) suggested topics for Listening Comprehension lessons. With guides written for over 200 pieces of literature, schools and teachers can choose according to their students' reading levels and areas of interest.

Integral to STL is the use of cooperative learning in teams of four that sometimes function as two partnerships. The teams are heterogeneously organized using two average, one low, and one high level reader. The cooperative segments of STL take advantage of young adolescents' social nature and focus it on academic work (Ares & Gorrell, 2002; Stevens, 2006b). However, since students do not naturally know how to work cooperatively, STL includes explicit instruction in the cooperative social skills. Lessons are provided both on basic skills (such as active listening and staying on task) and complex ones (such as clarifying ideas and negotiating). Explicit instruction in these skills is followed by teacher and student modeling and role playing of them, use of the skills during STL team activities, and teacher monitoring and reinforcing of the skills during partner, team and whole class activities.

Research on the Impact of STL

Several longitudinal studies have compared the achievement growth for students in schools using STL with those in matched schools not using STL. For example, Mac Iver, Ruby, Balfanz, and Byrnes (2003) conducted a four-year study of two closely-matched 5th-8th grade middle schools in Philadelphia. The study followed two cohorts of students as they progressed through the middle grades. STL participants outgrew comparison students on the Stanford 9 Reading Comprehension Test by one-quarter of a standard deviation in the first cohort and by .39

standard deviations in the second. Results from Pennsylvania State Standards Assessment (PSSA) provided further confirmation that STL accelerated students' progress in Reading; participants outgained comparison students by .35 standard deviations. In another study of middle schools in Philadelphia, Mac Iver, Balfanz, Ruby, Byrnes, Lorentz, and Jones (2004), compared the reading achievement gains across the last three years of middle school of 890 Student Team Literature participants from three large non-selective neighborhood schools with those of 662 nonparticipants from three control schools that were matched to the participating schools in racial composition, high poverty status, and past performance before Talent Development began in the district. Student Team Literature participants outgained non-participants by 4.3 normal curve equivalents during the last three years of the middle grades, an effect size of .29 standard deviations.¹ Ruby, Mac Iver, and Byrnes (2004) took this research one step further by using multinomial logit models to examine the impact of STL on change in students' reading proficiency levels on statewide tests by comparing 1,737 students at 3 high-poverty middle schools in Philadelphia with 9,773 students at 23 similar schools in the district that did not use STL. Students who experienced STL were 73% more likely to overcome a reading deficit during the middle grades as evidenced by moving up from the lowest reading proficiency level between 5th and 8th grade and were 43% less likely to develop a deficit as evidenced by slipping to the lowest reading proficiency level.

Herlihy and Kemple (2005) used a different analytic approach to investigate the impact of Talent Development Middle School Model on reading achievement in six nonselective, comprehensive middle schools in Philadelphia. Their approach combined an interrupted time

¹ A Normal Curve Equivalent (NCE) is a standard score indicating how a student's performance compares to statewide norms (on state assessments) or national norms (on national assessments). Scores in the norming population range from 1 to 99 with a mean of 50. The larger NCE gains in STL schools vs. non-STL schools indicate that during the middle grades students in STL schools are catching up to statewide norms in reading faster than are students in the control schools.

series analysis and a comparison schools technique. Thus, they compared the improvements (over the pre-intervention baseline) in TD schools versus those observed in comparison schools. They found that Talent Development Model significantly reduced the percentage of eighth-graders performing in the bottom quartile in reading achievement only in second- and fifth-years of implementation in these schools. The inconsistent pattern of results across different years (positive impacts on reading achievement in some years and no significant impact in others) may reflect the difficulties that these high-poverty urban schools experienced in sustaining reasonable levels of implementation in some classrooms in some years because of high levels of teacher mobility. Issues concerning the sustainability of the TDMG Model will be discussed in a later section.

TDMG's Mathematics Program

In 1996, TDMG began developing a Mathematics Program that combines coherent research-based instructional materials from the University of Chicago School Mathematics Project (UCSMP) – UCSMP's *Everyday Mathematics* in Grades 5 and 6, *Transition Mathematics* in Grade 7, and *Algebra* in Grade 8 -- or other National Science Foundation-supported middle grades courses of study such as *Mathematics in Context*, *Connected Mathematics*, *Mathscape*, and *Math Themes* with a multi-tiered teacher support system of sustained professional development and in-class coaching. These standards- and research-based curricula differ from the most commonly used middle grades mathematics programs in many crucial ways (Senk & Thompson, 2003). For example, these curricula:

- intentionally and systematically build upon the students' prior math knowledge, intuition, and number sense;

- present students with well-elaborated, varied, and realistic problem situations drawn from everyday life,
- introduce advanced mathematics topics early and often by including substantial strands featuring geometry, data and statistics, and algebra each year with investigations of these topics becoming more sophisticated in each passing grade;
- teach students how to use manipulatives (such as pegboards, pegs, and yarn to make broken line graphs) and visual tools (such as rate tables, bar models, and double number lines) to represent mathematical situations and support their thinking, analysis, and problem-solving;
- balance skill development in paper-and-pencil calculation with the development of mathematical intuition, flexible number sense, estimation, mental arithmetic, and prudent use of calculators, spreadsheets, and other technology;
- feature ongoing informal and formal assessments that match the types of learning activities in which students are engaged,
- provide students with a coherent sequence of learning activities designed to help them gradually progress from informal notions and simpler problems to using formal mathematical reasoning and representations to model and solve nonroutine problems,
- foster students' development of depth of understanding of key conceptual ideas and of proficiency in communicating these understandings through explanations of their thinking, strategies, and solutions and through evaluations or critiques of the mathematical thinking and strategies of others,

- include extensive instruction on rational numbers and proportional reasoning and the concepts and skills needed to solve problems involving fractions, ratios, rates, percents, and decimals,
- include regular use of cooperative learning groups.

Teachers were offered multiple tiers of professional development to support their implementation of the specific new mathematics curricula adopted by their school. Three days of summer training were followed by monthly 3-hour workshops on Saturdays. The workshops were grade specific and focused on the unit that would be using during the following month. The instructional facilitators leading the sessions previewed and modeled key activities, reviewed core content knowledge, and discussed appropriate classroom management strategies. In addition, the facilitators provided teachers an opportunity to discuss with each other what was and was not working in their own classrooms. In all, teachers had access to over 36 hours of professional development per year.

In addition to the monthly professional development sessions, teachers had in-classroom implementation support. Each school was assigned a curriculum coach who spent 1 to 2 days per week in each school working with teachers in their classrooms. Implementation support was nonjudgmental and included modeling, explaining, coteaching, assisting with lesson planning, observing lessons and providing confidential feedback, and working to identify and surmount any obstacles to strong implementation.

Research on the Impact of TDMG's Mathematics Program

The impact of the TDMG Mathematics Program on students' achievement growth in mathematics has been evaluated in several longitudinal studies. For example, Mac Iver et al.'s (2003) four-year-long quantitative case-study of two cohorts in two matched middle schools

found that students in the school that implemented the TDMG Math program outgrew their peers in the school that did not implement by .21 standard deviation units (on Total Mathematics achievement growth on the Stanford 9 during the first three years of middle school) in the first cohort and by .29 standard deviations in the second cohort. Analyses of student growth on the state test, the PSSA Mathematics test, found an even stronger effect of .36 standard deviation units.

Balfanz, Mac Iver, and Byrnes (2006) examined the levels of program implementation attained and the impact of the program on various measures of mathematics achievement in a study comparing three TD schools with three matched comparison schools in the School District of Philadelphia. Implementation levels were measured by an implementation index that combined survey measures from students and from curriculum coaches. Across the four years of the study, two-thirds to three-fourths of the classrooms in the TD schools obtained at least a medium-high level of implementation of the program. This suggests that the math teacher support infrastructure that TD established of ongoing professional development and in-classroom coaching was strong enough to withstand the high rates of principal and teacher turnover that occurred during these years. Students in TDMG schools outperformed students from the control schools on multiple measures of mathematics achievement growth during the middle grades. The average effect size by the end of middle school was .24 standard deviation units. In TDMG schools, the entire mathematics achievement distribution shifted upward between fifth and eighth-grade, but remained essentially unchanged in the control schools. TDMG schools had a ten percentage point advantage in the percentage of students gaining 5 or more and 10 or more state percentile points on the state's high-stakes mathematics test between fifth- and eighth-grade. Moreover, the TD schools were substantially more successful than the control schools in

helping students leave behind the “below basic math skills” achievement category for one of the higher classifications on this test by the time they reached 8th grade.

Herlihy and Kemple (2005) estimated the impacts of the TDMG Mathematics program on eighth-graders’ performance in Philadelphia by comparing the mathematics achievement time-series of six high-poverty, high-minority schools that began working with Talent Development Middle School Model between 1996-1997 and 1998-1999 with the achievement time-series observed in matched sets of comparison schools. Thus, two interrupted time series analyses were performed. The first analysis compared eighth-grade student performance in TDMG schools with the performance of earlier cohorts of eighth-graders in these *same* schools prior to program implementation. The difference between performance levels in the pre- and post-implementation cohorts is referred to as a “deviation from baseline.” The second interrupted time series analysis computed the deviations from baseline observed in a matched group of non-Talent Development schools, a group of comparison schools in the same district that have characteristics similar to those of the Talent Development schools. The final step in the analysis computed the differences between the deviations from the baseline in the Talent Development schools and the deviations from the baseline in the non-Talent Development schools; these differences are the estimated impacts of the TDMG Mathematics Program. These results showed that Talent Development had a positive impact on math achievement that became significant by the third year of implementation and then strengthened further during the next three years of implementation. For example, Figure 1 (reprinted from Herlihy & Kemple, 2005) plots the deviations from baseline (in normal curve equivalent points) for six Talent Development schools and 18 Non-Talent Development Schools on the state’s standardized assessment in mathematics. In both the Talent Development Schools and non-Talent

Development Schools, eighth-grade performance in mathematics improved over the years but the improvements were significantly greater in Talent Development Schools than in Non-Talent Development Schools. By Implementation Year 3, the cumulative improvement was 2.1 normal curve equivalents (NCE) greater in Talent Development schools. By Implementation Year 4, the cumulative improvement was 2.6 NCEs greater in Talent Development schools. By Years 5 and 6 of program implementation, the cumulative improvement was 2.9 and 3.4 NCEs greater in Talent Development than in Non-Talent Development schools. The effect size for Year 6 of program implementation had reached .23 standard deviation units.

When Talent Development Model began in Philadelphia, 75% of the eighth-graders were performing in the bottom quartile on the state assessment in mathematics. Thus, one important goal of Talent Development's mathematics program was to significantly reduce this percentage. Figure 2 (reprinted from Herlihy & Kemple, 2005) plots the deviations from baseline in the percentage of eighth-graders scoring in the bottom quartile in Talent Development and Non-Talent Development schools. By Year 6 of model implementation, Talent Development schools had reduced the percentage of students scoring in the bottom quartile by over 30 percentage points and this reduction was 11 percentage points (.29 standard deviation units) greater in Talent Development Schools than non-Talent Development Schools.

TDMG's Science Program

The development of the TDMG science program began in Fall 1997 at schools already working with TDMG in language arts and mathematics. These schools had made recent large expenditures on science textbooks. TDMG initially supported the use of these texts by 1) helping schools develop an appropriate order of teaching the text's topics (most texts were extremely large and could not be completely taught in one year), 2) providing professional development

focused on content knowledge to teachers with weak backgrounds in science, and 3) providing supplemental hands-on activities to help students understand the concepts taught.

Within the first two years of this support, it became clear that the texts and the form of instruction used with them were not fully engaging students in science. The texts were difficult to read not only because many of the students were reading below grade level but also because they covered a wide range of content and contained much new vocabulary. As a result, students often lost interest when reading on their own or when teachers tried to use reading aloud to ensure better understanding. The texts also proved difficult for the majority of teachers who did not have science backgrounds and who also struggled to keep up with the breadth of content. Because they did not feel comfortable with the content, these teachers primarily had students read the text and answer the chapter questions. The texts did provide some hands-on activities that generated greater student interest but in many cases these were quite simple and not well integrated with the content. The supplemental hands-on activities provided by TDMG were well received because they were more complex and taught the content but there were not enough of them to make a curriculum. A further constraint on both text and TDMG activities was that schools did not have adequate ordering and reimbursement systems to purchase the various materials from different suppliers needed for the activities.

At this time, a set of new science curricula became available. These were being developed by educational organizations funded by the National Science Foundation. These included the Full Option Science System (FOSS) and the Science Education for Public Understanding Program (SEPUP) developed at the Lawrence Hall of Science at the University of CA at Berkeley, Science and Technology for Children (STC) developed by the National Science Resources Center (a joint project of the Smithsonian Institutions and the National Academy of

Sciences), and Insights developed by the Education Development Center, Inc. These curricula took the shape of individual modules each addressing one topic that fell under the category of life science, earth and space science, physical science, or the nature of science. The benefit of the modular approach was that districts and schools could place modules in different grades to conform to the different state and local science standards that were being implemented. The modules were built around a set of hands-on activities that followed a logical progression to teach the topic. The modules took 6-8 weeks to teach or, for the more complex ones, 3-4 months. As a result, they narrowed the content covered and increased time spent on understanding it. Their focus was not only on doing activities but also planning them and interpreting the results. In this way, they addressed the most common criticism of hands-on activities: that while students typically enjoy such activities, they learn little from them. Since each module came with all the equipment needed to do the module's activities, adoption of the modules was also an easy way to provide each teacher the equipment needed to use a hands-on approach.

TDMG began introducing these modules into its partner schools, starting with the lower middle grades and moving up. Student reaction was very favorable. Students began to rate their liking of science class higher than any other academic class on TDMG-administered surveys. Teachers noted that the modules engaged students with weak academic skills who previously had disliked science. But the success of the modules depended heavily on implementation which required that 1) teachers were prepared to teach each lesson, and 2) teachers had first taught the class management procedures needed for cooperative hands-on work. Without these two conditions, student attention wandered and instruction gave way to a focus on classroom control.

TDMG professional development changed to foster these two conditions. During workshops, teachers perform every activity in the module just as they will later lead their

students to do in class. In this way, teachers learn what they need to prepare, how students should be organized, and what questions are likely to arise. The content behind each activity is discussed so that teachers know the key concepts to stress. The professional development workshops also provide classroom management techniques. Hands-on science requires students to take on a greater management role, e.g. planning the activities, picking up materials, using them in a group, keeping the group on task, returning the materials, and discussing the results. If the students don't learn these roles, inattention and even chaos may result. The professional development guides teachers in how to establish cooperative groups, teach social skills for group work, set rotating jobs for the members of each group, arrange the classrooms, and rotate among groups to keep students on task. This focus on what is to be taught in the next lessons and the best practices for teaching it distinguishes both TDMG's science and mathematics workshops from the traditional generic workshops that have failed to change teacher practices and student achievement. During the science workshops teachers are also given two sets of supplemental materials to help them increase students' depth of learning. The first is a set of reading lessons for use with module's readings to assist students comprehend these readings. The second is a set of module-specific homework assignments to provide students with opportunities to practice at home what they are learning in class and share that learning with their families.

To support what was learned in the workshops, a TDMG science facilitator worked with the teacher in their classroom on a weekly basis. Teachers vary in their strengths and weaknesses, and a workshop alone cannot address their individual differences. The facilitator observed the teacher and students in action and helped teachers to adapt what they have learned to the specific conditions and needs of the class through model teaching, co-teaching, and critical observation with confidential feedback. The facilitator helped customize the workshop material

so that implementation occurs in the desired fashion and inappropriate modifications are avoided. For example, teachers with weaker classroom management skills often replaced student activities with classroom demonstrations, negating the benefits of having students organize and carry out the activity. A facilitator in the classroom observed this modification and the reason behind it and helped teachers gain the management skills necessary to return to the use of student activities. As the teacher and students become more skilled at this type of instruction, the facilitator advised the teacher on how to further increase the student role.

The science facilitator also has the role of working with the school administration to establish structures to support the change in instructional approach. Timely ordering of materials (both replacements and consumable items) is key to maintaining a hands-on instructional approach and the facilitator helps to establish a formal ordering procedure. For example, each teacher may inventory modules after use and turn in a replacement order to a lead teacher, who then organizes it and turns it in to the staff person responsible for ordering. When the materials arrive, the process is reversed so that restocking of each module occurs. Another important structure is to establish a regular science faculty meeting so that ideas to improve instruction can be raised and technical needs addressed. Facilitators are also in a position to identify science teachers who could take on leadership responsibilities such as training new teachers in the modules. With administration support, these teachers can receive extra professional development and greater responsibilities for maintaining the new curriculum especially after the partnership with TDMG is reduced or ends.

Program implementation at each school was measured by fidelity of implementation scores based on ratings provided by an experienced science facilitator who visited the school each week. For each science class section, the facilitator for a given school rated the frequency

of the teacher's use of the recommended modules and instructional practices, the number of science modules taught to the section during the year, and the extent to which the teacher participated in the monthly professional development sessions.

Research on the Impact of TDMG's Science Program

Ruby (2006) compared the achievement results of a cohort moving from 5th through 7th grade from 1998 through 2001 at three Philadelphia middle schools working with TDMG to three matched control schools and to the districts' twenty-one schools serving high-poverty high-minority student populations. Growth in achievement between the end of 4th and the end of 7th grades was measured using the district-given Stanford 9 Science Achievement Test.

In cooperation with the district, the control schools were chosen based on similarities in student poverty levels, student attendance, racial and ethnic make-up of the student body, and previous years' performance on the standardized achievement tests. Two of the three experimental schools had a smaller percentage of White students than their controls. In most cases, the experimental schools' previous year test score averaged slightly higher than their controls. Using growth in test scores rather than absolute scores helped adjust for these modest differences.

Two multivariate analyses were carried out to examine the impact of the TDMG science program on student achievement. The first examined the impact of student exposure to the program on the change in their science achievement test scores between 4th and 7th grades. The second examined the impact on their change in science achievement level between the two grades. The analyses controlled for race/ethnicity, gender, English as a Second Language (ESL), special education status, attendance, and behavior.

The first analysis found that overall students at the treatment schools benefited from the TDMG program gaining about 3.5 scaled points or 2 NCEs more for each year of exposure in comparison to students at the matched control schools (or 2 scaled points and 1.2 NCEs versus students at the 23 district middle schools). When the analysis was further targeted by school, students at two of the schools had significant gains of over 7 points or 4 NCEs per year of exposure while students at one school made no significant gains versus their control school. Interestingly, the latter school also had a low level of implementation of the science program while the other two schools had medium to high levels. A 1 standard deviation change in exposure to the TD science program at Schools 2 and 3 leads to about a .20 standard deviation greater gain in test score as compared to a student in the matched control schools.

The second analysis examined the change in student proficiency levels (below basic vs. basic and above) between the end of 4th grade and the end of 7th grade. At the two experimental schools with medium to high implementation of the TDMG science program, the probability of moving from below basic to basic or above rose 9% for each year a student was in the TDMG program. At the same time, the probability of falling from basic or above to below basic fell 8-10% per year.

In addition to looking at student achievement, this study also examined implementation and found that it varied both within and between schools. Within schools, different grades adopted the program to different extents and there were large differences in implementation between schools as well. However, in both cases implementation rose over time. While the study could only analyze the achievement results for one cohort (because the district dropped science testing for later cohorts), analyses of implementation levels indicated an increase for

each successive cohort. By the third cohort, all three schools had reached medium to high levels of implementation.

Providing Individually-Targeted Academic Help for Students Who Need Additional Supports

Beyond the Schoolwide Reforms

Despite the substantial positive impacts of TDMG's Schoolwide Instructional Programs on student achievement and engagement, there will always be some students who, in order to succeed, need additional supports that are more intensive and individualized. The knowledge and skill gaps and resulting motivational problems that some students bring with them to middle school are simply too vast to resolve without providing the students with special shepherding that includes substantial extra doses of targeted instruction, guided practice, and independent practice opportunities delivered by one of the school's most qualified and encouraging teachers. Thus, from the very beginning, the TDMG model has helped participating schools start a Savvy Readers lab for students who struggle with reading and a Computer- and Team-Assisted Mathematics Acceleration lab for students who struggle with mathematics. Each lab is offered as an elective course (with approximately half of the normal class size) for ten or twenty weeks to provide students a substantial "extra dose" of intensive and personalized instruction while they continue to attend all of their regular academic classes.

The Savvy Readers (SR) Lab

The extra learning opportunities offered in the Savvy Readers Lab help struggling students become proficient at understanding what they read and at acquiring new learning from their reading so that they can begin experiencing more success across the standards-based curriculum in their school. The Lab seeks to liberate these students to become independent readers who assume responsibility for their own learning and who understand and enjoy higher-

level books. The SR lab provides explicit instruction and practice in applying a wide variety of powerful reading strategies to various types of narrative and expository reading material.

The SR lab has four major components: (1) instruction in strategic reading, (2) practice of reading strategies, (3) rotation of learning centers and, (4) coaching and in-class support for the SR lab teacher.

Explicit instruction in reading strategies. At the beginning of each lab period, students receive a mini-lesson covering a related set of reading strategies. The strategies help them construct meaning while they read (for example, by assisting them to decode unfamiliar words while reading, infer meanings of unfamiliar words, make predictions, monitor understanding while reading, repair comprehension when understanding slows down or stops, and identify and master important new vocabulary). The TD program publishes a comprehensive set of mini-lessons to go along with each *classwide book* used in the Lab – a book which everyone reads such as *The Air Down Here*, *Komodo Dragon*, or *Seedfolks*. The lessons show the teacher how to use the book to introduce and model the reading strategies.

Practice of reading strategies. Each day, students practice applying the reading strategies using a classwide book or an independent book chosen by the student from the lab's library. Using strategy stickers, students make note of strategies they use as they read and then share their experiences with the class. Students also maintain journals to keep track of progress, respond to reading, and communicate with the teacher.

Rotation of learning centers. For two periods a week, students move to four learning centers where they continue to practice and develop reading and writing strategies independently and in small groups. Students rotate among a computer center (where they use software to improve reading and vocabulary skills), a listening and recording center (where they listen to

books on tape or tape a portion of a book they are reading for the teacher to evaluate), an information resource center (where they engage in independent reading from a variety of books and magazines), and a writing center where students work on writing assignments from their other classes, and /or assignments specific to the SR lab. Each writing center is equipped with multiple copies of books designed to inspire writing and give students ideas for writing projects, as well as various reference books useful to writers such as a thesaurus, a dictionary, and rhyming dictionary. Each Savvy Reader Lab also has an independent reading library which includes at least fifty independent reading books spanning a four-year range of reading levels and five genres to accommodate individual needs and interests. Each book has a pocket at the back containing instructions for four culminating activities. When students finish a book, they select and complete one activity that demonstrates their understanding of and their reactions to the book.

Coaching and in-class support for the SR lab teacher. A reading specialist from Johns Hopkins regularly visits each school's lab teacher to provide one-on-one professional development, support, assistance, and useful feedback.

Quasi-Experimental Research on the Impact of the SR Lab

A quasi-experimental study was conducted in Philadelphia during the 2000-2001 school year to estimate the impact of the SR Lab on student achievement. Pre- and post-measures of reading achievement were available for 43 of the 44 eighth-graders who participated in the SR Lab at a middle school in Philadelphia. A comparison sample of eighth-graders – with matching prior reading comprehension scale scores from Spring 2000 – was drawn from a demographically matched comparison school that did not have a SR Lab. Whenever possible, the selected comparison student was also the same gender as the participant. However, in the few

cases where no same-gender match was available, we selected a comparison student of the opposite gender but with the same prior achievement. The resulting groups had identical mean reading comprehension scale scores of 639 (a Grade 5 equivalent score) prior to the intervention.

By sampling eighth-graders from another Philadelphia middle school that was demographically similar to the treatment school, we were able to successfully identify a comparison group of students with equal prior achievement to our participants. We then were able to estimate the effect of the SR lab (when combined with the schoolwide STL program) on participants' achievement by comparing the scores of the two groups on the Spring 2001 administration PSSA Reading Assessment. SR Lab participants scored 45 scale score points higher on the PSSA Reading Achievement test for an effect size of .44.

Computer-and Team-Assisted Mathematics Acceleration (CATAMA) Lab

The CATAMA Lab is taught by one of the school's full time, certified, and experienced mathematics teachers who is viewed by his or her peers as skilled and effective and who is familiar with the NSF-supported math curriculum being taught at the school. The CATAMA teacher receives intensive initial training and regular follow up visits from one of TD's CATAMA facilitators who has previously taught the lab and who offer expert assistance and direction. Students usually attend the lab for just one grading period per year. The lab offers a way to accelerate the math learning of a large number of students because it can accommodate 5 classes a day of 16-20 students per class with new students taught each grading period. To facilitate instructional focus and integration with the regular classroom, each of the five daily sections of the CATAMA Lab is dedicated to a particular grade/need combination. The first period class, for example, may contain 8th graders struggling in algebra, the second period might address 8th graders with weak basic skills, (e.g., multiplying positive and negative numbers),

while in the third period 6th graders might need to learn how to move between decimals, fractions, and percentages. Over the course of the year, the lab can serve a broad spectrum of students and typically targets students performing between the 25th and 65th percentiles. The goal with lower-performing students is to raise them to average math performance. The goal with higher-performing students is to provide enrichment that helps prepare them for selective high school programs. Because the lab content varies by grade and by need, students often take the lab more than once over the course of their middle school career.

CATAMA combines the instructional power and flexibility of a strong mathematics teacher (Ma, 1999), the individualized extra-help capabilities of computer-based instruction (Abidin & Hartley, 1998), the motivating and cognitive aspects of peer-assisted learning (Fuchs et al., 1997), and the power of small group and individual tutoring (Wasik and Slavin, 1990). By combining instruction in math concepts as well as skills, the CATAMA Lab also avoids the traditional criticism leveled at remediation programs of failing to challenge and motivate students because of repetitive practice of low-level skills (Knapp, 1995).

Each CATAMA class is taught using three main instructional components. *Class begins with the CATAMA teacher providing approximately 15 minutes of whole group instruction that previews skills and concepts students will be working with in their regular classrooms in the near future.* This is done for two purposes. First, it helps the students learn the concepts by giving extra time on each concept. Second, it helps them stay interested and focused in their regular math class. By having some understanding and experience with new concepts before they are introduced in the regular classroom, students will have a better chance of following the material in that class rather than becoming frustrated.

Class continues with 20-30 minutes of individualized computer- and peer-assisted instruction. Each CATAMA lab has 10 to 15 networked computers. Students use instructional software tailored to their grade and needs. The software provides pre-assessments, worked/illustrated examples, structured and tiered problem sets, instant feedback, and quizzes and tests that students need to pass at pre-determined levels. Students are paired and then teamed with students at similar skill levels. Peer-assisted learning techniques are taught so that the students can “Ask three before me” or, in other words, first ask their partner, and then their other two teammates if they don’t understand something before they ask the teacher. In addition, partners take turns being the “reader” who reads the problem and any instructional tips aloud and the “solver” who inputs the solution. Each student then individually takes the quiz. This is done to encourage students to take time to read problems and consider solutions, rather than just attempt to apply the operation they think the problem is calling for (Kilpatrick, et al., 2001)

The computer- and peer-assisted learning features of the lab also free up the CATAMA teacher to spend time implementing the third instructional component of the class -- *individual and small group tutoring*. This is where, for example, a student who does not know his or her times tables can get help.

Experimental Research on the Impact of the CATAMA Lab

A series of experimental studies have estimated the impact of the CATAMA lab on achievement by giving all the students in the school the same math curriculum in their regular math classes but randomly assigning some students to receive CATAMA as an elective for one semester while assigning the others to receive one of the school’s other elective courses. Ruby and Balfanz (2006) reported results for middle grades students (mostly 8th graders) participating in a randomized experiment assessing the impact of the CATAMA Lab on achievement in

mathematics. The students were drawn from 3 schools in Philadelphia serving high-minority high-poverty student populations. Within each regular math class, eligible students (n=431) were randomly assigned to CATAMA or to a regular elective. All students were pre-tested and post-tested using the CTBS TerraNova mathematics test. As might be expected, the randomization resulted in comparable groups that were not different in pre-test achievement, grade, or gender composition. The results show that CATAMA students doubled the test score gains of control students (a gain of 22 scale score points vs. 11 scale score points, $p < .01$, Effect Size = .26 standard deviations). Subgroup analyses reveal that the CATAMA benefited students regardless of their prior achievement levels. The program also benefited students with both high attendance and low attendance at school, though the high attendance students showed the greatest gains. Replications of this experiment with 81 Ojibwe students in grades 5-8 in Cass Lake, Minnesota (Ruby 2007b) and with 79 9th-grade students in Philadelphia (Ruby 2007a) yielded even stronger achievement impacts, with the experimental group outgaining the control group by 20 scale score points in grades 5-8 and by 27 scale score points in grade nine. The effect sizes in the 5th-8th and 9th grade replication studies were .87 and .68 standard deviations, respectively.

Summary of TDMG's Instructional Programs

So far, this chapter has summarized TDMG's facilitated instructional programs and extra-help labs that seek to ensure that each student has a good year of learning in each major subject during each year of the middle grades – a year featuring coherent, high quality instruction from teachers who are receiving ongoing coaching and professional development to assist them in learning the content knowledge and pedagogical skills they need to make effective use of the curricula and instructional materials in their subject areas. The chapter has also summarized a

variety of research studies in high poverty schools that each sought to measure the impacts of a specific program or lab on the learning achieved by participating students. The results of this research suggest that the schoolwide instructional programs and the elective extra help labs do positively impact students' learning trajectories and help them begin to close the achievement gaps these students bring with them as they enter the middle grades. The effect sizes ranged from one-fifth to two-fifths of a standard deviation except for the somewhat larger effect sizes found for the intensive, individualized labs. Traditionally, an effect size of one-fifth or two-fifth of a standard deviation has been considered small (Cohen, 1988). However, recent research specifically concerned with field studies of educational interventions has found that effect sizes of this magnitude represent serious practical impacts equal to 34% -133 % of a year of learning during the middle grades given the slowing annual achievement growth typically found during these grades (Bloom, Hill, Black, & Lipsey, 2006; Kane, 2004; Keller, 1995). Kane (2004) notes that the national samples used to norm the math SAT 9 found an effect size of .50 when comparing the achievement of 4th and 5th graders , i.e., a whole school year of instruction was associated with just one-half of a student-level standard deviation gain in test score. Similar research by Bloom, et al., (2006) but with a larger sample of tests and students and grade levels determined the effect size for the increase in standardized test scores in math for an increase in 1 grade using 6 commercially available standardized math tests. They found an effect size of .59 in comparing the achievement of 4th and 5th graders, of .41 when comparing 5th and 6th graders, and of .30 when comparing 6th and 7th graders. When compared to these effect sizes, the size of the TD's effects -- increasing student achievement by an additional one- to two-fifths of a standard deviation -- indicate that the model's instructional programs add a substantial increment to students' achievement growth in the middle grades.

Schools are About More Than Just Learning

It is not enough, however, just to help students learn more during the middle grades and develop lifelong learning abilities. There are other outcomes in the middle grades that are quite important and that have large impacts on students' well-being and future prospects (Bornstein, Davidson, Keyes, & Moore, 2003). It is currently unfashionable in many districts and states to pay much attention to students' emotional and physical health or to schools' climate or peer culture. Very few districts even try to measure these outcomes systematically. Yet middle grades students in the U.S. -- compared to their peers in other countries -- report high levels of emotional and physical problems, extremely negative school climates, and unkind and unsupportive peer cultures (Juvonen et al., 2004; Nishina, Juvonen, & Witkow, 2006). Unfortunately, NCLB has led to high-stakes testing and accountability systems that largely distract schools and districts from considering the well-being of their students holistically or their students' longer-term outcomes across the life course (Juvonen, 2007; Sunderman, 2007). Physical, cognitive, and social-emotional dimensions of well-being -- that may be quite predictive of longer term outcomes but that don't have clear and immediate impacts on student's test performance -- have been receiving less attention from educators as they have been compelled by heavy-handed accountability to focus increasingly on the narrow and short-term goal of "making AYP this year." As important as it is to improve the learning opportunities and achievement growth of students, such improvements are not enough to ensure their well-being.

School Organization and Climate Improvement: Establishing Structures for Caring, Positive Behavior Supports, and Productive Partnering

High-poverty middle-grades schools are often dysfunctional institutions characterized by debilitating practices, attitudes, and relationships that produce a school climate of alienation,

danger, disorder, and despair (Balfanz, Ruby, & Mac Iver, 2002; Balfanz, 2007). To improve such a climate, a school must be helped to implement organizational and interpersonal supports that nurture positive and mutually supportive interpersonal relations among members of the school community.

The TDMG model addresses school climate at several levels. First, TDMG staff assists schools to attain judicious use of communal organization structures such as small learning communities, strategic semi-departmentalization, interdisciplinary teaming, and looping (Balfanz, Ruby & Mac Iver, 2002; Black 2000; Lincoln, 1998). These *structures for caring* (Darling-Hammond, 1997) give teachers the opportunity to work with a smaller group of students for longer periods of time, facilitate closer connections with students and their families, and help teachers view students as “my kids” rather than “other people’s children.”

Five years after the original TDMG Model was created, it became clear that these communal organizational structures by themselves were not enough to improve the climate of the most troubled schools in the growing TDMG network. In response, TDMG launched a schoolwide climate program that helps teachers and administrators in these schools to establish an orderly climate, reduce disruptive student behaviors, reach out to students in emotional crisis, and promote positive interpersonal relations throughout the school. The program also seeks to change social norms and peer cultures that foster problematic behavior. Specific components of TDMG’s High Five climate program address lateness and attendance, acting out in the classroom, disorder outside the classroom, bullying, and school and neighborhood safety issues (Sorrell, 2001; Sorrell & Mac Iver 2002). In addition, the program stresses positive rewards for good behavior and assists schools in developing small-group and individualized interventions for the most troubled and disruptive students.

TDMG schools are also encouraged to participate in Johns Hopkins University's National Network of Partnership Schools, which works with schools to develop effective school, family, and community partnerships (Sanders & Epstein, 2000). The network provides schools with support and resources to help create healthy communication and involvement with students' parents and communities.

TDMG's organizational, climate, and partnership programs – though less directly focused on learning than TDMG's instructional and extra help programs – may be very important in helping keep students in poverty on a trajectory to high school graduation. These structures for caring, positive behavior supports, and school-family partnering practices are key in raising attendance, reducing misbehavior, and marshalling and coordinating the efforts of teachers, families, and other community members to prevent student failure and disengagement. Balfanz, Herzog and Mac Iver (2007) have shown that attending school less than 80% of the time, poor behavior, or failing a math or English course are early warning flags that identify 60% of the sixth-grade students in Philadelphia who will not graduate from the school district on-time or one-year late.

Does the TDMG Model Help Keep Students on a Path that Leads to Graduation?

Graduating from high school is a hope and expectation that virtually every parent has for his or her child because failure to graduate has dramatic impacts on the child's future prospects. The prevention literature suggests that school-wide interventions like the TDMG model are the first line of defense against the forces pushing students off the graduation path. With its focus on effective and engaging instruction, substantial extra help, and establishing structures that enhance community and help students and teachers come to really know and care about one another, the TDMG model should reduce the numbers of students who display the early warning

signs of chronic poor attendance, poor behavior, or course failures, and should increase the odds that students ultimately graduate. The TDMG model has been existence long enough now to allow us to begin comparing the graduation rates of students who experienced the model during the middle grades with those of comparable students who did not. We estimated the impact of the TDMG model on preventing students from developing sixth-grade warning signs of dropout risk and on students' actual graduation rates by comparing the data of 540 students from three schools Philadelphia who experienced the model during their years in the middle grades with the data of 604 students from matched schools that did not experience the TDMG model. The sample includes all students who were 6th-graders in Philadelphia's first three TDMG schools in the 1998-1999 school year or who were 6th-graders in the three non-TDMG schools that had been selected by the research office of the School District of Philadelphia as the district's most comparable middle schools to serve as control schools. As described in Table 1, these six large middle schools mainly serve minority students from low-income families. Overall, the TDMG schools when compared to their control schools served slightly more Blacks (77% vs. 71%), slightly more Asians (7% vs. 4%), fewer White students (3% vs. 12%) and more special education students (19% vs. 10%) than did the control schools but had equal percentages of females (52%), Hispanics (13%) and English language learners (4%).

The first indication that the TDMG model might ultimately increase graduation rates was its impact on reducing the percentage of students who developed chronic poor attendance, low grades, or poor behavior as 6th-graders. Table 2 shows that TDMG sixth-graders were less likely than control sixth graders to develop the early warning signs of high dropout risk that have been identified by Balfanz, Herzog, and Mac Iver (2007). That is, TDMG sixth graders were less

likely to display poor attendance habits, get poor or failing math grades, get poor English grades, or receive an out-of-school suspension or unsatisfactory behavior mark.

Past research following an earlier cohort (the 1996-1997 cohort) of 13,000 of Philadelphia's 6th-graders during that school year and for seven additional years found that the district's overall graduation rate (on-time or one year late) was 43% (Balfanz, Herzog, & Mac Iver, 2007). The "non-graduates" include both out-of-district transfers (15%) and those who explicitly dropped out (42%). Some of the transfers may have eventually graduated from another district or from a private school (information on what happened to them after they left the district was not available). The graduation rate for sixth-graders with one or more of the early warning signs was only 29%. These overall graduation rates include data from some schools that are more advantaged than our present sample of six high-poverty high-minority schools that enrolled 1144 sixth graders. The overall on-time graduation rate in the present sample was 39%. For TDMG students the graduation rate was 45%; whereas the rate for control students was lower at 33%. Table 3 follows the students in the present sample for six years after they entered the study as sixth-graders at one of the three TDMG schools or one of the three control schools during the 1998-1999 school year. The table indicates what percentages of students followed the hoped for progression through the middle and secondary grades (i.e., reaching each subsequent grade on time and graduating on time). The table also shows the percentages of students who fell off the path leading to on-time graduation from the district (i.e., those repeating a grade or leaving the district). As shown in Table 3, TDMG students were more likely to stay "on path" than were the control students. For example, 91% of the TDMG students made it to 9th grade on time vs. 80% of the control students. Similarly, 51% of the TDMG students vs. 40% of the control students made it to 12th grade on time.

We used a binary logistic regression to model the difference in the odds of graduating on-time for students who had attended a TDMG school or a control school throughout the middle grades. The analysis also took account of the impacts of each student's ethnic group, gender, special education status and English language learner status on his or her odds of graduating on time (see Table 4). The large odds ratio of 1.55 associated with being a TDMG student indicates that -- holding ethnic group, gender, special education, and English Language Learner status constant -- TDMG students were 55% more likely to graduate on time (versus falling behind, transferring out-of-district, or dropping out) than were the control students.

Sustaining Comprehensive Reform in the Middle Grades

The research reported here, along with research on other middle grades reform models such as Turning Points, Making Middle Grades Work, Middle Start, and AIM (e.g., see Juvonen et al., 2004), suggests that middle grades reform models can help students learn more and stay on a path toward graduation by ensuring that they receive the basics of good schooling in the middle grades. This involves providing engaging, meaningful, and challenging curriculum and instruction, delivered by trained and supported teachers, in positive, serious, and safe schools designed to give students the personalized attention they need to succeed in a high-standards learning environment.

Little progress has been made, however, in sustaining such comprehensive reforms for more than half-a-dozen years in the typical middle-grades school or district (Herlihy & Kemple, 2004, 2005; Juvonen et al., 2004; Williamson & Johnston, 1999). Teacher, principal, and district leadership turnover; budget, professional development, and staffing reductions; and changing policies, politics, and politicians along with cyclical shifts of attention away from the middle grades to the elementary and/or high school grades often combine to threaten the sustainability

and continuity of middle grades reform efforts. As a result, successfully reformed middle-grades schools often see even their most effective, well-implemented reforms dismantled over time.

Even when an instructional reform is not dismantled, its impact can be muted in a given school in a given year if there is a high level of teacher turnover. For example, during each 3-year period between 1998 and 2004, over one-half of the teachers in Philadelphia's high-poverty middle grades schools transferred to other higher-performing, less-troubled district schools, to non-district schools, or to other professions; some of those who stayed were assigned to teach a completely different subject or grade level in order to fill one of the schools' many vacancies (Balfanz, Ruby, & Mac Iver, 2002, Ruby 2002; Useem, 2001a, 2001b; Useem & Neild, 2001). These high levels of teacher turnover lead to marked dips in Student Team Literature implementation in some years in some TDMG schools until the replacement teachers were brought up to speed with the training, coaching, and materials they needed to implement the program (Balfanz, Ruby, & Mac Iver, 2002). These fluctuations in implementation led to inconsistent results across years, with positive reading achievement results in some years and no significant differences in reading achievement between TD and control schools in other years.

It is encouraging that some policymakers are awakening to the need to take steps to create more stability and continuity across time in the reforms, leadership, and staff in urban schools. This awakening is partly due to recent reports that document startling turnover in principals in high-poverty middle schools (e.g., ACY 2007a, 2007b) who are then replaced with inexperienced successors. For example, 90% of the high-poverty schools in Baltimore experienced one or more principal changes in the last five years (ACY 2007a). 80% of the schools had two or more principal changes. Half of the schools experienced three or more principal changes during this five-year period.

Urban districts also experience superintendent/CEO turnover with startling frequency (Hess, 1999). For example, during the most recent five-year period (2002-2007), Baltimore has had five different CEO's. With such high levels of turnover at the top of urban districts, it is little wonder that many of the most promising whole-school and whole-district reforms are not sustained over time.

Fortunately, there is greater awareness of the dropout crisis in the U.S. than ever before (see www.gradgap.org for more information). This awareness is increasingly accompanied by an understanding that one key to keeping students on a path that leads to graduation is to implement and sustain comprehensive reforms in the middle grades (Balfanz, 2007). There is therefore reason to hope that more communities will find the means and the will to sustain such reforms.

How Narrow Testing and Broad Standards Can Sabotage Certain Instructional Reforms

The last ten years have been the heyday of standards and high stakes testing in American education. Disappointing trends in science education in the middle grades during this period highlight the unintended negative consequences that testing and standard-setting decisions can have. Science reform in the middle grades was greatly hampered by the omission of science from the initial testing requirements of No Child Left Behind (NCLB) and by the adoption of science standards that emphasize breadth over depth in most states and districts. NCLB accountability to date has focused on raising students' reading and math test scores. As a result, science and other subjects have been neglected in favor of reading and math. Such neglect includes lack of funds to purchase science materials or support science teacher professional development, stealing from science instructional time in order to devote additional time to math or reading instruction or to test preparation activities, and lack of administrative interest in

science (Blanc, Useem, & Ruby 2005). This neglect may slowly change as science achievement becomes part of calculating annual yearly progress, but many states have yet to implement science testing.

The national standards movement intended to establish a clear set of learning goals for students to meet by grade or groups of grades. Often this intent included a reduction in the number of these goals so that students would have more time to learn each (as reflected by the slogan “depth over breadth”). But most states and districts have established long lists of science standards for each grade, and breadth has won out. As a result, it is difficult for teachers to spend 6-8 weeks on one topic using a module that only covers a small number of standards. Unless states and districts revise both their standards and standardized tests to reward depth of study, pressure continues to favor the use of textbooks that include more topics. As a result, a whole host of wonderful and engaging science modules for the middle grades that were created with support provided by the National Science Foundation continue to be sadly underused in our nation’s middle grades schools.

It also been disturbing to see increasing amounts of instructional time in the middle grades devoted to narrow assessment preparation. As the John Lounsbury, the editor of the *Middle School Journal*, says, “We are in danger of winning the battle of test scores but losing the battle of education.” Finding ways to shape the assessments in state accountability systems so that they constitute worthwhile incentive structures for classroom instructional practice in the middle grades is one of the greatest challenges faced by educational policymakers in the 21st century (Mac Iver & Mac Iver, in press).

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Table 1

Demographic Characteristics of Middle Schools in Study Exploring Odds of Graduating On-Time (in 2005) for Sixth-graders Who Spent the Middle Grades in TDMG and Non-TDMG Schools

Characteristics of School in 1998-1999	TDMG School A	Control School A	TDMG School B	Control School B	TDMG School C	Control School C
Grade Span	5-8	5-8	5-8	5-8	6-8	6-8
% Low Income Students	86	92	86	92	71	80
% Minority Students	89	71	99	89	99	99
Enrollment	1116	739	977	902	1189	755

Table 2

Were TDMG Students Less Likely than Control Students to Display Early Warning Signs of Dropout Risk – Low Attendance, Low Math and English Grades, and Bad Behavior – As Sixth Graders?

Variable	TDMG (n = 540)	Control (n = 604)	t (df = 1142)	p
% attending less than 80% of the days	9%	18%	-4.39	0.000
Average math mark (A= 4, B = 3, etc.)	2.4	2.0	5.07	0.000
% failing math	6%	15%	-4.81	0.000
Average English mark	2.4	2.2	2.86	0.004
% failing English	7%	9%	-1.410	0.159
% with at least 1 out-of-school suspension	27%	34%	-2.471	0.014
% with a final “unsatisfactory behavior” mark in at least one class	36%	47%	-3.82	0.000

Table 3

How Well Did Sixth-Graders Enrolled in 1999 in Talent Development Middle Grades Schools (T, n=540) and Control Schools (C, n=604) Stay on Path to Graduate in 2005 (on time)?

% who were in ...	2000		2001		2002		2003		2004		2005	
	T	C	T	C	T	C	T	C	T	C	T	C
6 th grade	1	3	0	<1	0	<1	0	0	0	0	0	0
7 th grade	99	92	4	5	2	<1	<1	0	<1	0	0	0
8 th grade			96	84	5	10	1	<1	1	1	1	0
9 th grade				2	91	80	22	36	9	16	4	5
10 th grade					<1	1	66	50	13	13	8	9
11 th grade							<1	1	44	26	7	6
12 th grade									<1	1	51	40
% who actually graduated									<1	<1	45	33
Cumulative % who left the District	0	4	0	9	2	9	11	13	33	44	30	40

Note. The percentage of students who were in the expected grade in each following year is in **bold**.

Table 4

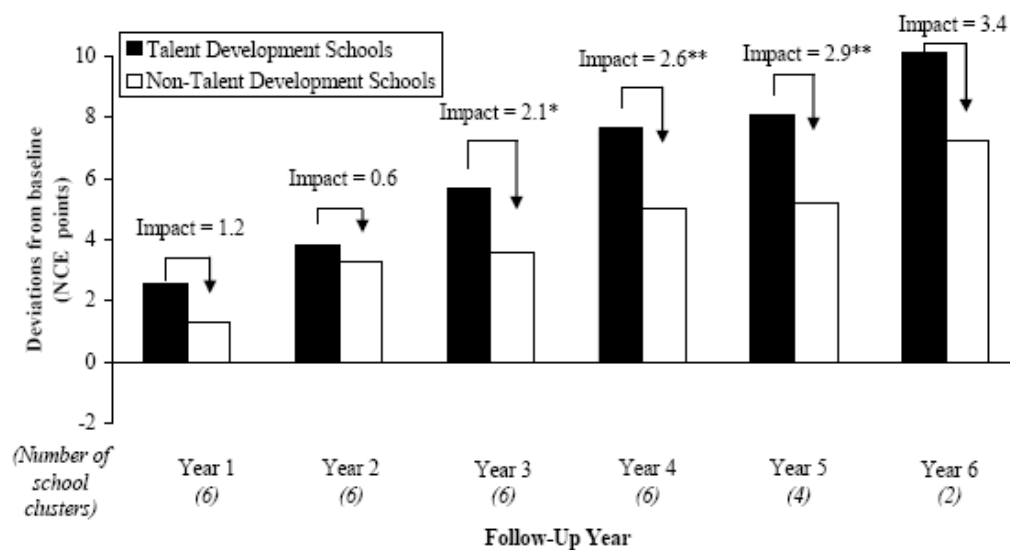
Logistic Regression Model Estimating Odds of Graduating On-Time for TDMG and Control Students While Adjusting for Differences in the Graduation Rates of Different Subgroups

Predictor	Odds Ratio	Parameter	SE	p
Asian	1.87	0.63	.30	0.036
Hispanic	0.83	-0.18	.19	0.337
White	0.53	-0.64	.27	0.019
Female	1.60	0.47	.12	0.000
Special Educ.	.87	-0.14	.18	0.432
English Lang. Learner	.81	-0.21	.37	0.569
TDMG	1.55	0.44	.13	0.001

The Talent Development Evaluation

Figure 1

Impacts on SSA Math NCE
for Eighth-Grade Students in Early-Implementing Talent Development Schools
Six-Year Follow-Up Results

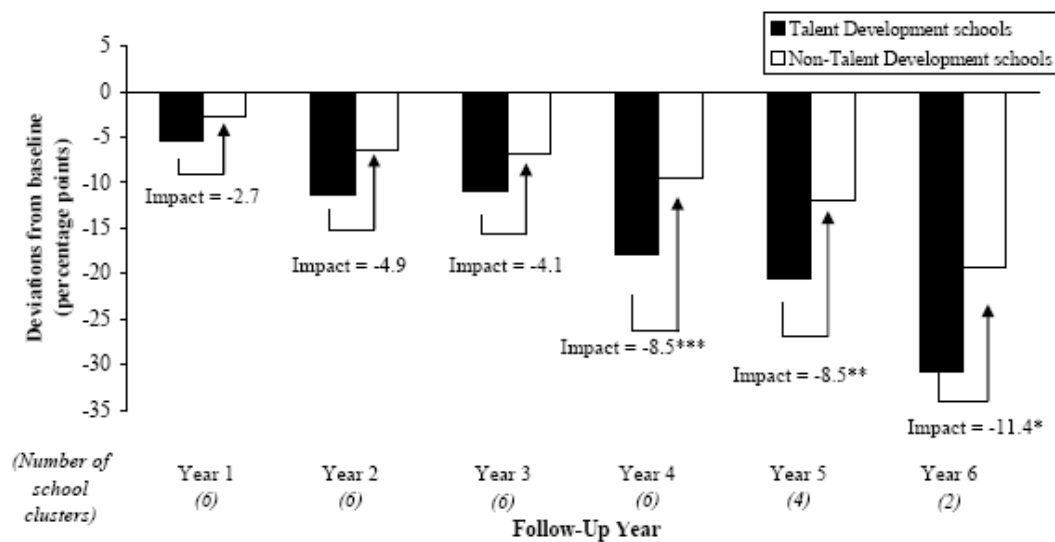


SOURCE: MDRC calculations from individual students' school records from a large, urban school district.

The Talent Development Evaluation

Figure 2

Impacts on the Percentage of Students in the Bottom Quartile of SSA Math Scores for Eighth-Grade Students in Early-Implementing Talent Development Schools, Six-Year Follow-Up Results



SOURCE: MDRC calculations from individual students' school records from a large, urban school district.