

**New Visions for Public Schools
Math Project Concept Paper
September 2007**

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I. Introduction

In its continuing, nationally-watched efforts to restructure the New York City public school system, the Department of Education (DOE) has created a differentiated management structure that permits outside organizations to become Partnership Support Organizations (PSOs), and take direct responsibility for providing academic support for schools. As a PSO, New Visions has been selected to work with sixty-three schools, serving approximately 30,000 students. These schools are intentionally varied to include 31 small high schools, five large high schools, 14 grade 6-12 schools, seven transfer schools, five elementary schools and one K-12 school. We believe that the diversity of schools in New Visions' PSO network will provide us with the opportunity to gain a deeper understanding of the strategies necessary to ensure that urban secondary-school students graduate prepared for college or careers.

A critical feature of the New Visions PSO is that all supports are organized around the SAM methodology in an effort to build these schools' capacity to aggressively increase student achievement, ensuring that more students graduate on time and college ready. Each school is assigned a Leadership Development Facilitator (LDF) at a ratio of approximately one to every five schools. The LDF provides intensive onsite coaching to a school inquiry team. Each of the 63 school teams (and multiple teams in large schools) uses the SAM methodology of examining student data, selecting a target population and developing, testing and refining strategies that improve the achievement of that population. With an explicit goal of creating strong leadership across the school and improving the quality and rigor of classroom instruction, SAM has the potential to redefine the ways schools can be supported at scale.

At this new developmental stage of SAM, we seek support to deepen the implementation and effectiveness of the SAM model around mathematics, which we believe is critical to increasing student achievement and preparedness for college. Working in partnership with the Charles A. Dana Center at the University of Texas at Austin and their collaborators at the educational technology company, Agile Mind, we propose to deepen the impact of SAM through four key strategies:

- **Building math leadership:** Support New Visions' Leadership Development Facilitators (LDFs) who work with school-based SAM teams around best practices, interim assessments and professional development in Algebra I across New Visions PSO schools.
- **Strengthening Classroom Instruction:** Work intensively in 5-8 schools to build instructional capacity in math to ensure that math practices and strategies developed by the SAM team spread throughout the school community.
- **Developing Youth Leadership:** Pilot Academic Youth Development (AYD), a summer bridge experience that reshapes the beliefs, attitudes and behavior of influential students to model engagement and academic success and help shape classroom culture.

- **Spread Effective Practices Across Schools:** Create a Math Task Force to develop an appropriate mathematics curriculum and assessment support strategy to deepen the work of SAM teams across the PSO.

Our overarching goal is to improve mathematics achievement in integrated Algebra across New Visions' PSO. Specifically, by the end of the project we hope to achieve the following outcomes:

- Deepened understanding of school leaders of the pedagogy, tools and structures that support effective Algebra instruction and result in improved student achievement;
- Improved classroom instruction in integrated Algebra in a targeted subset of New Visions PSO schools; and
- Transfer of the SAM mathematics strategies to New Visions' PSO schools through the guided adaptation and use of the tools, materials and systems developed by the project partners and participants.

II. The Challenge

Mathematics continues to present a critical challenge to student achievement. Numerous studies document that an aptitude in mathematics is a key indicator of later success in college, and that taking and passing advanced math courses is an important indicator of college readiness. An ACT study found that students who complete four years or more of math (Algebra I and II, Geometry, Trigonometry and Advanced Calculus) scored 4.4 points higher on the ACT (a 12% advantage over other students).¹ Similarly, ACT found that only 13% of high school students who have completed only Algebra I and II and Geometry are able to enter and pass a college math course.² CUNY has also recognized that the current New York State standards for meeting the high school mathematics requirements are not high enough to indicate readiness for college-level mathematics. Although students can graduate high school with a score of 65 on the mathematics Regents, CUNY requires a 75 on the Math A Regents for entry level courses. Students who do not meet this higher standard often end up in remedial, non-credit bearing courses at a two-year college during their first year.

Against this backdrop, New York City has not excelled at improving the achievement level of significant numbers of public school students in mathematics. Part of the issue is structural. In 2001, Chancellor Levy's Math Commission called for a comprehensive review of the standards that serve as the basis for both New York State's and New York City's mathematics curriculum, and emphasized the importance of professional development as the key to ensuring that teachers remain effective and current as the content and pedagogical strategies of mathematics education change. Indeed, the State has responded and is rolling out new Mathematics curricula over the next three years. Abandoning Math A and Math B, the State will be creating three new high school math courses: Integrated Algebra, Geometry and Algebra II/Trigonometry³. In addition, students must pass these courses with higher scores on the Regents exams to receive credit and graduate.

¹ http://www.act.org/path/policy/pdf/success_report.pdf

² http://www.act.org/path/policy/pdf/success_report.pdf

³ Most schools are beginning to implement Integrated Algebra this fall; and further rollouts will take place for Geometry next year and Algebra II /Trigonometry following that.

The State's new math curriculum sequence represents a dramatic shift both in the way math is taught as well as in the new standards, assessments and expectations it creates for students. All students will be expected to complete an integrated Algebra I course that goes deeper into mathematical theory and problem solving than did the Math A curriculum. Many math teachers lack the content knowledge to teach at this deeper level. In a curriculum grounded in the idea that students must develop a deep understanding of the key concepts underlying each content area, it's critical that teachers themselves have this understanding. Longer term, as we move to Geometry and Algebra II, there will be an even greater shortage of teachers with the knowledge and background to teach the Regents courses.

Data from New Century and other New York City high schools underscore the challenge of implementing these new standards, raising the achievement level of all students, and accelerating the performance of enough students to have an impact on college admissions and success rates after high school graduation. Within New Visions' New Century schools, for example, of the students scheduled to graduate in 2007, 88% passed the one required math Regents exam. While this looks promising on the surface, when we dig deeper into the data, challenges begin to emerge. Currently, 55 is considered a passing score on the Regents exams. Against the new state standards, where this year's incoming freshmen must achieve a passing grade of 65, the number of cohort 2007 students passing the math Regents drops to 71%. Furthermore, to be considered college-ready at CUNY, students must pass the Regents at 75 or higher – only 32% of this group was able to reach that benchmark.

Data also shows that while the majority of students are not having difficulty accumulating math credits, the courses that most are taking are basic mathematics courses. Few students are taking the rigorous, advanced courses such as calculus that will help prepare them for college or highly skilled jobs. Of the 1,007 seniors in New Century high schools last year, only 7%, or 75 students, were enrolled in pre-calculus or calculus courses.

III. SAM and Mathematics

We believe that SAM is one way to begin to address this challenge. We have piloted the SAM strategy in 17 schools and see it as an effective means to build the capacity to raise student achievement across our PSO schools. Partnering with the Dana Center and Agile Mind, we propose a two and a half year initiative to improve student performance by creating a cadre of leaders, classroom teachers and students with a much deeper understanding of mathematics.

With the end goal of increasing college readiness, we will focus our efforts on the critical course of Algebra I. More than ever, the skills needed for college admission and success, as well as for a growing number of careers, require achievement in higher levels of mathematics. Algebra I serves as the gatekeeper that determines whether many students will be able to engage in high levels of mathematics and, consequently, succeed in college and access numerous promising career tracks. Schools participating in this work will have access to Dana Center supports and Agile Mind online tools and interim assessments for strengthening performance in Algebra I. The online resources give teachers and their students the comprehensive support they need for success in this crucial gateway course. When used in recommended ways, they help teachers effectively prepare their students for higher-level mathematics. In addition to Internet-delivered tools, educators and administrators will also have opportunities to participate in face-to-face seminars and receive

mentoring and support materials from the Dana Center/Agile Mind to manage their demanding workloads, improve their expertise, and improve outcomes for their students.

The training, tools, and technical assistance provided by the Dana Center and Agile Mind will be integrated into New Visions' work with schools at the leadership, classroom teacher and student levels. Leadership Development Facilitators will learn how to use these resources to support the work of the SAM inquiry teams at their respective schools. Classroom teachers will gain a deeper understanding of Algebra I and learn how to use interim assessments to strengthen their practice. And incoming ninth grade students will participate in an intensive summer bridge program that will enable them to enter ninth grade fully-prepared to dive into Algebra I.

A. Building Math Leadership within and across Schools

In our SAM pilot schools, New Visions Leadership Development Facilitators (LDFs) work with school teams to build their capacity to analyze data and student work, formulate strategies to improve student achievement and implement those strategies with feedback and assessments of effectiveness. In one high school, for example, a small learning community (SLC) team participating in SAM focused on incoming sophomores who fell below the SLC's standard of an 85 average in math courses and were lacking foundational math skills in factoring and determining the lowest common denominator (LCD). With the support of the SAM facilitator, teachers are developing curriculum maps for each math course and, based on continual data analysis, are meeting once a week to revise the maps and discuss student progress. They have also analyzed the Regents exam to understand how factoring and LCD are weighted and adjust their instructional focus accordingly.

As a newly designated Partnership Support Organization, New Visions is now responsible for providing instructional support to and improving student achievement in a group of 63 schools, including 51 small and large high schools. Our goal is to ensure that each of these schools prepare their students to reach a new, higher bar for high school graduation: graduating college and career ready. To help its schools achieve this goal, each of the New Visions school will receive on-site leadership coaching based on the SAM methodology. We have expanded our staffing to include 14 Leadership Development Facilitators (LDFs), each of whom will work with an average of five schools, supporting their leadership teams in defining, implementing and assessing school improvement goals that address their individual school's needs.

The effectiveness of our school support would significantly increase if New Visions' 14 Leadership Development Facilitators and their school teams had access to expertise in mathematics instruction and assessment. We therefore propose to collaborate with the Dana Center and Agile Mind to build the capacity of our LDF's to help their schools analyze and improve their students' performance in mathematics. To lead this work and build mathematics expertise in the organization, New Visions will hire two math specialists: including one Mathematics Leadership Development Facilitator and one Mathematics Classroom Practice Facilitator, who will receive intensive training from the Dana Center and Agile Mind and coordinate the project.

On an ongoing basis, this new Math team, together with Dana Center, will co-facilitate biweekly sessions with the 14 LDF's, examining data collected and developed by their SAM teams, helping formulate research-based strategies to incorporate in the schools' work, and developing formative assessments that enable school teams to gauge the effectiveness of their strategies and make immediate corrections. In addition to this support, the Dana Center would make Agile Mind's

comprehensive online tools around mathematics instruction available to the LDF's for use with their school teams. These resources—developed by distinguished math educators and reviewed and refined by researchers and practitioners—put authoritative resources at teachers' fingertips.

Given their national expertise on curricular implementation, Dana Center staff will work with New Visions to fashion a support strategy around the implementation of the new Regents mathematics curriculum in the upcoming year. When looking for tools or guidance to differentiate and accelerate instruction for students with grossly deficient skills upon entry in 9th grade, our SAM participants have found the standard New York State curriculum woefully inadequate. The Dana Center/Agile Mind staff will provide supports that bridge the gap between the actual math abilities of students and the demands of the new curriculum. This work will have an impact on all schools within the PSO network.

B. Strengthening Classroom Instruction in Mathematics

One of the conceptual and practical challenges we continue to confront in the SAM strategy—at the school level and in national pilots – can be loosely defined as the “spread” question. The SAM team builds enormous capacity and ultimately shifts teachers from abstract conceptions of good teaching to concrete definitions of classroom practice grounded in demonstrable improvement in the achievement of specific students in the target population. But the challenge remains: how to spread the influence of the SAM team to all reaches of the school. In mathematics, for example, how do we work with the SAM team to build systems of professional development and the scaffolding necessary to address the specific learning needs of students beyond the SAM target population? How do we build the teachers' skills in using assessment strategies that enable them to identify students who are five minutes, five days and five months behind? And how do we arm them with concrete, differentiated, research-driven strategies that can be quickly implemented across a diverse classroom population?

Working with the Dana Center, we will launch more intensive work with up to 25 mathematics teachers in 5-8 schools who will develop instructional strategies and systems focused on Algebra I and ultimately support a broader mathematics leadership development effort in their schools. This group will have the capacity to use the best tools and knowledge available to improve student achievement in mathematics, including those developed over a decade of research and development by leaders at the Dana Center and Agile Mind. We will engage teams of at least two math teachers from each school who will work with New Visions' Math Classroom Practice Facilitator in an intensive model of one-on-one in-classroom work, individual observation, modeling, and coaching around the new Regents curriculum. The math facilitator would be in each participating school the equivalent of one day per month and draw on Dana Center supports and Agile Mind resources. Additionally, teachers will have multiple opportunities to come together as a group, to receive training in Dana Center/Agile Mind online tools and high end formative assessments, examine student work, share their strategies for improving student performance and reflect upon their practice. This work would be closely aligned with the school's SAM leadership team to ensure coherence and maximize the impact on student achievement over the year.

The goal is that participating teachers will gain confidence and competence in the use of the self-paced tools from Agile Mind and will help shape adaptations of the tools to the needs of New York City educators. Agile Mind's services are currently aligned to New York State standards and to versions of the textbooks being used by New Visions schools but we anticipate further

enhancements as New Visions teachers deepen in their use and as new state Regents requirements are implemented.

C. Developing Youth Leadership around Mathematics

In addition, in the 5-8 schools receiving intensive support, New Visions/Dana Center would pilot an Academic Youth Development Initiative (AYD) for incoming 9th grade students. AYD is a summer-school intensification and yearlong follow-up program designed to build a cadre of students committed to excelling in high school mathematics and to working with their teachers to create productive learning environments in their classrooms. Through a curriculum inspired by recent advances in developmental psychology, social psychology, neuroscience, and the learning sciences, students learn psychological perspectives shown to be key to academic achievement; master problem-solving skills that are important to success in upcoming mathematics courses; and become quiet leaders who help their teachers create a welcoming culture of respect, engagement, and accountability in their classrooms. The effort is also designed to re-engage disengaged teachers in nurturing the academic aspirations and accomplishments of their students. The intervention hinges on a simple strategy: rather than focus on the behavior of all students, the program addresses and reshapes the beliefs, attitudes, and behavior of a few influential students. These students become a cadre of *student allies* upon whom mathematics teachers can rely to model respectful engagement and academic success and thus help shape the classroom culture during the regular school year. We believe that a successful pilot could become the basis for a more aggressive use of summer school and bridge programs using public dollars in subsequent years.

D. Spreading Effective Mathematics Practices across Schools

The ultimate goal of the SAM Mathematics pilot is to demonstrably improve student performance in mathematics, ensuring that students graduate from New Visions schools prepared to pursue credit-bearing college mathematics courses relevant to their academic and career interests. This will entail change in practices, structures and systems at the teacher, classroom and school levels. New Visions will create a Mathematics Task Force with a mandate to examine the current and desired status of mathematics teaching and learning across New Visions schools, establish a common vision for mathematics teaching and learning in the PSO, create an appropriate mathematics curriculum and assessment support strategy for the PSO, and establish the foundations of relational trust that enable participants to build, enhance, and sustain it. The Math Task Force members will include lead staff from the Dana Center, Agile Mind, the New Visions Math Team, and representative principals and lead teachers from the 5-8 pilot schools.

IV. Outcomes and Deliverables

The partnership will include an embedded evaluation strategy that addresses both the implementation and impact of the program. The evaluation will include analysis of quantitative data, classroom observations, surveys and interviews. Key questions include:

- What changes in adult behavior do we believe will result from this work, and how do we measure these changes? Do teachers show evidence of changed practice? Is there an increased sense and evidence of mathematics leadership?

- Do students show evidence of learning? Do students' attitudes towards learning and mathematics change?
- How does implementation vary across schools and school type? What strategies are most effective in driving changes in student achievement?
- Is there evidence of more effective systems for spreading practice within and across schools in the PSO?

Through a detailed data analysis, we will determine a baseline of math performance in the 5-8 targeted schools, and work with school teams to set clear goals for student progress. Using periodic assessment data and classroom observation, we will support schools in continuously measuring student progress against that baseline. New Visions and its partners will be constantly examining this data to assess changes in practices, structures and systems at the classroom and leadership levels of our schools and inform the planning for the expansion of the initiative beyond the initial pilot.

V. The Partners

The Charles A. Dana Center is a research unit of The University of Texas at Austin's College of Natural Sciences. Established in 1993 by mathematics professor Philip Uri Treisman, the Dana Center is nationally recognized for its work developing and delivering research-based professional development and resources to raise student achievement in K-16 mathematics and science, especially in districts that serve low-income and minority populations. The Center provides educational support, directly or through intermediaries, to more than 50,000 Texas mathematics and science teachers and more than 10,000 school administrators. At the national level, the Dana Center (in partnership with Achieve) is at the hub of the newly formed Urban Mathematics Leadership Network, which is building scalable teacher support systems for large and diverse school systems.

Agile Mind Inc. is an education company formed in 2001 to enhance both access to and high achievement in challenging academic courses. In collaboration with the Dana Center, the company has developed a research-based system of online and face-to-face support in mathematics that includes resources for implementation of a mathematics-focused Academic Youth Development Initiative designed to change the culture of 9th-grade Algebra classrooms. These services have been used in more than 800 schools over the past five years, to serve almost 10,000 educators and 700,000 of their students – most of them in underserved areas.