ABSTRACT: This Brief provides a preliminary overview of the Transition to Advanced Math (TAM) program in APS high schools. Designed for the 9th graders, TAM is an elective course intended as an intervention for students who are below grade level in math and unprepared to succeed in Algebra 1, a requirement for graduation. The Brief focuses on the implementation of the program and identifies issues that impede maximum student success. Because the program has not been active long enough to defensibly evaluate associated impacts on student achievement, this report presents an initial examination of the achievement of TAM students compared to their non-TAM peers in District Benchmark Assessment (DBA) Algebra 1 and Geometry 1.1 The Brief identifies the strengths and potential as well as drawbacks of the TAM program, discerned from the interviews with a few teachers and APS staff involved in implementing the TAM program in APS high schools.

DESCRIPTION OF THE PROGRAM

Transition to Advanced Mathematics (TAM) is a research-based program developed by Johns Hopkins University’s Center for Social Organization of Schools. Designed for ninth graders, this mathematics course is intended to improve students’ essential understanding of key math concepts and basic math skills, to prepare the students for Algebra 1. The course goals go beyond simple test preparation and train students to tackle high school math and science, even a postsecondary career.

TAM works as a precursor to Algebra 1. Algebra 1 is a course that students must master to move ahead in math and science and is a requirement for high school graduation. The TAM program’s salient features are:

1. Double dose of instruction where students are in a TAM classroom every day and with the same teacher for an entire year;
2. Focus only on strategies in the first semester followed by a concentrated curriculum of Algebra 1 in the second semester;
3. Well-designed instructional materials and student journals.

1 Test scores are important but only one of many measures of any program’s impact on student achievement. In case of TAM, other measures of program impact would include enrollment in more advanced math, long-range post-secondary career goals, short- and long-term success in math as compared to a carefully selected control group, and the students’ sense of self-efficacy with respect to mastery of math. However, a randomly selected treatment-and-control-group study design or study of long-range program impact are outside the scope of this Brief.
One of the essential features of the TAM program is that one teacher instructs the TAM students every day of the week for an entire year, first in a TAM math strategies class, and then in an Algebra 1 class. This program structure distinguishes TAM from other programs that include extended math hours in that those programs schedule strategies and Algebra 1 simultaneously and could include two separate teachers, each seeing students two-to-three days per week for extended class periods.

The program incorporates instructional material and student consumables. TAM provides strategies for the teacher to help students acquire the math competencies necessary for successfully learning Algebra 1. Under the TAM program, students are expected to work in a rich learning environment where they learn from one another and are trained to connect math to the real world. Under TAM program guidelines, teachers participating in the program receive substantial coaching support and professional development.

**TAM Program at APS High Schools**

School year 2010-11 is the third year of the program in APS. The program grew from three pilot sites in 2008-09 to 10 schools in 2009-2010, and down to seven schools in 2010-2011. Five of the seven schools are currently in their second year of the program.

**Student Selection:** TAM provides intervention for students lowest in math achievement. Students are selected through screening exams such as ITBS, teacher recommendations, classroom performance, and performance on DBA and SBA. They are the students most at risk for failing Algebra 1 and academically the neediest in math intervention. They comprise roughly a fifth of the freshman class in the high schools implementing TAM program.

**Year 1:** Johns Hopkins piloted the program in La Cueva HS, Highland HS, and West Mesa HS in 2008-2009. With APS high school block schedules, students get 90 minutes of TAM Math Strategies everyday in the first semester and 90-minute blocks of Algebra 1 everyday in the second semester. Johns Hopkins used Eldorado, Rio Grande HS, and Valley HS as comparison schools in which “Stretch”2 Algebra curriculum of the District’s choosing was administered. Johns Hopkins provided materials and other support for the three pilot schools during the first year.

**Year 2:** In the second year, APS expanded the program to 10 schools and the District picked up the cost of the program in terms of materials for teachers and students. The District also provided four full days of professional development. Teachers had an opportunity to plan together for the year during professional development. Furthermore, instructional coaches provided site-based support to teachers twice a week throughout the year. Additionally, coaches provided monthly sessions for teachers which they called “Beyond the traditional classroom.”

**Year 3:** This school year, the third year of the TAM program, there are seven schools in the program as three schools opted out. Money was an issue for many schools as the schools were expected to bear the cost of the program. Of the remaining seven, some schools are offering fewer sections of the program. The summer preceding the school year 2010-2011, the District provided extensive

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2 Stretch model involves doubled math instruction time as TAM does. However, the difference is that Stretch Algebra 1 and Strategies classes are both year-long and simultaneously conducted, often by two separate teachers.
professional development through the two-week long Algebra Institute that included content, pedagogy, and TAM program. The Institute offered the opportunity for teachers to plan together as they had reportedly found such planning valuable during previous year’s professional development sessions.

**Report on TAM Program’s Impact**

Johns Hopkins’ TAM pilot at APS, conducted in Year 1 (2008-2009), compared the impacts of TAM and “Stretch”, another math intervention involving double dosing of math in the 9th grade. The TAM and Stretch models vary in that TAM involves Strategies class in the first semester and Algebra 1 in the second, whereas Stretch incorporates a year-long Algebra 1 backed by a year-long Strategies class.

The study purpose was to find out if the educational impact of the two models differed significantly. The program impact was measured with pre- and post surveys, given at the beginning and end of the year, measuring the students’ perceptions of their math competence, attitudes towards math, and beliefs about the nature and usefulness of math. The second survey also asked about the frequency of certain math activities in their classroom and how much they enjoyed the math class.

The survey results showed that TAM students felt more successful in math, liked math better, were more engaged, felt supported by the teacher, and reported studying harder compared to their “Stretch” peers. The study also compared the students in TAM and Stretch in terms of the CTBS scores in the Fall and Winter, the end-of-the-year Algebra skills, and grades and credit accumulation. The TAM students gained two percentile points on CTBS, did better on math skills tests, were less likely to fail, and more likely to be successful in Algebra 1, compared to the students in Stretch program.

**Sample and Data**

During the 2009-2010 school year, 10 traditional APS high schools offered TAM as a Math Strategies elective class in preparation for Algebra 1. Students identified as TAM participants were those enrolled in Math Strategies with teachers assigned to use the TAM program. Because TAM is a math remediation program, the student comparison sample was comprised of 2010 Algebra 1 enrollees who were not proficient in math on their 2009 8th grade NMSBA. There were 2,293 students in the analytic sample, of which 436, or about a fifth, were TAM participants. Table 1 presents the analytic sample by school.

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Table 1 Distribution of TAM/Algebra 1 Analytic Sample 2009-2010

<table>
<thead>
<tr>
<th>School</th>
<th>TAM students and peers not math proficient on 2009 8th grade NMSBA enrolled in Algebra 1 2009-10</th>
<th>TAM students’ percentage of Analytic Sample</th>
<th>TAM Student Count</th>
<th>TAM Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuquerque</td>
<td>192</td>
<td>13%</td>
<td>29</td>
<td>1</td>
</tr>
<tr>
<td>Atrisco Heritage</td>
<td>299</td>
<td>13%</td>
<td>43</td>
<td>2</td>
</tr>
<tr>
<td>Cibola</td>
<td>182</td>
<td>10%</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>Del Norte</td>
<td>127</td>
<td>22%</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>Eldorado</td>
<td>142</td>
<td>11%</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>Highland</td>
<td>184</td>
<td>26%</td>
<td>65</td>
<td>5</td>
</tr>
<tr>
<td>La Cueva</td>
<td>97</td>
<td>26%</td>
<td>34</td>
<td>2</td>
</tr>
<tr>
<td>Río Grande</td>
<td>297</td>
<td>5%</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Valley</td>
<td>169</td>
<td>28%</td>
<td>65</td>
<td>3</td>
</tr>
<tr>
<td>West Mesa</td>
<td>168</td>
<td>40%</td>
<td>111</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,293</strong></td>
<td><strong>19%</strong></td>
<td><strong>436</strong></td>
<td><strong>23</strong></td>
</tr>
</tbody>
</table>

The analytic sample: Performance on Algebra 1 and Geometry 1

No performance differences were evident when comparing TAM students with the analytic peer group on the Spring 2010 Algebra 1 DBA. This could be interpreted as a positive finding because students were believed to be enrolled in TAM because they were identified as having the greatest need. When exploring Fall 2010-11 Geometry DBA scores, TAM students outperformed their analytic peers by a small margin. This can be interpreted as TAM students being prepared for Geometry 1, and being at par or having a small advantage in math over their peers.

These results should be viewed with caution because the TAM students as well as their comparison group remain in a low range of performance level in both Algebra 1 and Geometry 1. The long-term benefit of TAM program remains to be seen.
Table 2  Performance Differences on Algebra 1 and Geometry 1, 2009-2010

<table>
<thead>
<tr>
<th></th>
<th>Algebra DBA Spring 2010</th>
<th>Geometry DBA Fall 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Score</td>
</tr>
<tr>
<td>Algebra 1 Peers</td>
<td>1,329</td>
<td>35.7</td>
</tr>
<tr>
<td>TAM students</td>
<td>338</td>
<td>34.7</td>
</tr>
</tbody>
</table>

Reflections of APS Practitioners Implementing TAM

This section offers reflections by a few of the teachers and coaches. While this information is anecdotal, and not representative of views of all teachers and coaches in the program, it is nevertheless valuable in illustrating perceptions about the strengths and weaknesses of the program.

The Most Valued TAM Features

**Flexibility:** Teaching units are well organized and teacher materials specify instructional elements and activities for hands-on learning. However, the teachers are able use their judgment to modify the suggested activities to make them more relevant to the students. Some instructors reported beginning Algebra 1 instruction prior to the end of Fall Semester in the interest of allowing adequate time to cover Algebra 1.

**Expanded instruction time with one teacher:** TAM allows a significantly expanded contact between the math teacher and students with class meeting everyday for an entire school year with the same teacher.

**Structure of the program:** One semester of strategies and a subsequent semester of concentrated course year-long Algebra 1 help fortify students’ math fundamentals.

Roadblocks in Getting the Full Benefits of the Program

**Lack of consistency**
- Teacher turnover - in many schools, new teachers are replacing teachers who have had a year with the program
- Buy-in - Teacher buy-in and a strong teacher commitment to program practices and goals are important but not always achieved or attainable
- Monetary issues - budgeting for the program at the school level involves costs of materials, professional development for teachers, and twice as much instruction time

**Context development:** The candidates for this program can be one to four grades below the 9th grade, ranging from students needing a simple confidence booster to those who struggle with reading or completing simple addition and subtraction problems. This range of student competencies poses challenges for the teachers.

**Scheduling:** Schools may find it challenging to schedule students and teachers for two periods for the entire school year.
Concluding Remarks

The teachers and coaches RDA interviewed, thought the TAM program structure was well-designed in moving the struggling students forward to completing Algebra 1 and preparing them for other math classes. The teachers and coaches also indicated that there were several hurdles in implementing the program in order to accomplish its goals and accrue full benefits of the program. Some of the hurdles included: a lack of consistency in implementation of the program; program monitoring and support not accepted or received as intended by the program design; serious scheduling issues since TAM demands twice as much time as required by traditional classrooms from each TAM teacher and student; budget issues involved in teacher time and program materials; and inconsistent TAM teacher buy-in, an important ingredient for program success.

There is evidence that the TAM program is a useful intervention for students requiring substantial mathematics remediation prior to taking Algebra 1. Scheduling TAM participants to the same math teacher every school day for a year, a unique feature of the program, appears to have merit. TAM Math Strategies instructional materials are student friendly for students below grade levels, having simple text and learning activities designed for small learning groups or dyads. The materials also make math relevant to the everyday world and, thus, more meaningful. The program design includes strong coaching support in proper implementation of the program. The daily schedule and appropriate materials for TAM students provide skilled teachers ample opportunities to address the complex issues necessary to raise struggling students’ skill and confidence levels in math.