TO: School Board Members

FROM: Terry B. Grier, Ed.D.
Superintendent of Schools

SUBJECT: Academy of Accomplished Teaching in Mathematics and Science (A²TeaMS)

CONTACT: Carla Stevens, 713-556-6700

Attached is the 2008–2009 evaluation report on the Academy of Accomplished Teaching in Mathematics and Science (A²TeaMS). A²TeaMS provided ongoing professional development in content, pedagogy, and leadership in mathematics and science for many secondary teachers within the district.

Some of this year’s key findings are as follows:

- Four A²TeaMS staff worked with 61 teachers across 36 HISD campuses. The A²TeaMS staff coached mathematics and science content for year one.

- Slight improvement occurred from spring 2008 to spring 2009 on the Stanford 10. In spring 2008, students of A²TeaMS teachers attained an average mathematics NCE of 50.0. Mathematics scores remained consistent at 50.5 NCEs in spring 2009.

- In spring 2008, the average science scores on the Stanford 10 were 47.3 NCEs. After being taught by A²TeaMS-trained teachers, students' science scores increased to 49.5 NCEs in spring 2009. This was an increase of 2.2 in NCEs.

Attachment

cc: Superintendent Direct Reports
   Tracy Weeden
   Jolene Yoakum
RESEARCH
Educational Program Report

A²TEAMS
2008–2009

Department of Research and Accountability
Houston Independent School District
2009 Board of Education

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**EXECUTIVE SUMMARY**

**A2TeAMS**

**2008–2009**

**Program Description**

The Houston Independent School District (HISD), in partnership with Rice University, provided intensive professional development through the Houston Independent School District/Rice Model Science Labs. The Rice Model Science lab program was designed to train twelve secondary science teachers per year in a setting removed from their home school. By expanding the HISD/Rice Model Science Labs, the Academy of Accomplished Teaching in Mathematics and Science (A2TeAMS) was developed. A2TeAMS provided ongoing professional development in content, pedagogy and leadership in mathematics and science for many secondary teachers within the district. The purpose of the A2TeAMS was to expand upon the methods of the Model Science Lab program, by reaching a greater number of mathematics and science teachers. The daily practice of the teachers was embedded with the A2TeAMS approach. For the 2008–2009 school year, A2TeAMS maintained five program goals, which are as follows:

- Create a learning organization that provided a coordinated, systematic, district-wide opportunity for consistent on-going mathematics and science professional development on a large scale.
- Increase mathematics and science content and pedagogy knowledge of participating teachers as evidenced by rigorous, inquiry-based lessons aligned with the district curriculum, including natural mathematics-science connections.
- Increase student achievement in mathematics and science with a focus on student college readiness.
- Ensure the written curriculum is taught in the classroom.
- Increase administrators’ knowledge of best practices and ability to assess and support best practices in mathematics and science.

Moreover, the approach used in A2TeAMS required that teachers were paired with A2TeAMS staff and teams of secondary teachers to strengthen the academic programs at each participating school.

**Purpose of the Evaluation**

The purpose of the evaluation was to assess if A2TeAMS was effective in meeting the unique needs of each participating teacher and school. Therefore, it was necessary to collect information about the training process. Additionally, it was necessary to evaluate the performance and perceptions of the teachers who attended the trainings. Administrators were also asked about their perceptions of the A2TeAMS process. The following questions were addressed:

1. How was the A2TeAMS program structured in 2008–2009?
2. How were teachers performing on the walk-through observations?
3. How did teachers perform on pre-test and post-test assessments?
4. What were teachers’ level of satisfaction with A2TeAMS?
5. What were administrators’ level of satisfaction with A2TeAMS?
6. How did students of A2TeAMS-trained teachers perform on standardized tests?

**Key Findings**

1. How was the A2TeAMS program structured in 2008–2009?
• Four A²TeaMS staff worked with 61 teachers across 36 HISD campuses. This resulted in a ratio of one coordinator to eighteen teachers. The A²TeaMS is designed so that each teacher is involved for three consecutive years: year one focuses on content and pedagogy; year two focuses on making mathematics-science connections and increasing leadership skills; and year three focuses on analyzing practice through action research.

• Teachers participated in professional development during the summer, followed by one full-day workshop each month and a two-hour after school session each month of the school year. Additionally, two Saturday sessions were required. This year, A²TeaMS offered 140 training hours.

2. How were teachers performing on the walk-through observations?

• A²TeaMS staff conducted 96 walk-through observations during the 2008–2009 year.

• In 76 percent of the observations, teachers had “Clearly Posted Objective” and in 52 percent of the observations, students of A²TeaMS teachers were “Aware of Learning Goal.” However, “Mathematics/Science Connections” was observed 21 percent of the time.

• A²TeaMS stressed three types of teaching strategies during the course of the school year. They were the 5E Lesson Model (Engagement, Exploration, Explanation, Elaboration, and Evaluation), the Marzano Strategies, and Bloom’s Taxonomy. All were chosen as part of this teacher-training program due to their proven educational benefits and importance to student learning.

• For the 5E Lesson Model, teachers focused on explaining with 48 observations followed by exploring and elaborating, both with 13 observations. For the Marzano Strategies, A²TeaMS teachers seemed to do best with Non-Linguistic Representations (25 observations) followed by Similarities and Differences (24 observations). For Bloom’s Taxonomy use in the classroom, teachers tended to participate in remembering (46 observations) and understanding (45 observations) most.

3. How did teachers perform on pre-test and post-test assessments?

• Twenty-nine mathematics and science teachers took both the pre-test and post-test instruments. Fifteen science teachers and fourteen mathematics teachers took both assessments.

• Overall, teachers improved 2.5 points on the assessments, which was statistically significant (p<.05). A total of 40 possible points could be earned on the knowledge-based assessment.

• Mathematics teachers improved 3.2 points from pre-test to post-test, and this was statistically significant (p<.05).

• Science teachers, demonstrated an improvement of 1.9 points from pre-test to post-test, and this was statistically significant (p<.01).

4. What were teachers’ levels of satisfaction with A²TeaMS?

• On a four-point scale, teachers reported an overall satisfaction level of 3.75 for all items combined. For the item, “Instructors were knowledgeable,” 98 percent of respondents agreed or strongly agreed with this statement.
• Over 97 percent of A²TeaMS teachers were looking forward to coming back in the future. The majority of teachers’ responses indicated that they were pleased with their participation in A²TeaMS.

5. What were administrators’ level of satisfaction with A²TeaMS?

• Overall, administrators were satisfied with the A²TeaMS trainings that their teachers have participated in over the last year. On a four-point scale, administrators’ total level of satisfaction with the A²TeaMS program was 3.67 for all items combined.

• All administrators agreed or strongly agreed to “plan to have teachers participate next year.” Finally, 100 percent would recommend this program to colleagues.

6. How did students of A²TeaMS-trained teachers perform on standardized tests?

• On the TAKS mathematics test, students of A²TeaMS teachers improved in commended performance compared to the previous year and a comparison group of students.

• Students of A²TeaMS teachers showed some improvement on Stanford results from 2008 to 2009. With the Stanford Achievement Test, students of A²TeaMS teachers showed consistent performance from spring 2008 to spring 2009 in mathematics scores. In spring 2008, students of A²TeaMS teachers attained an average mathematics NCE of 50.0. Mathematics scores increased to 50.5 NCEs in spring 2009.

• In spring 2008, science average scores were 47.3 NCEs. After being taught by A²TeaMS-trained teachers, science scores increased to 49.5 NCEs in spring 2009. From spring 2008 to spring 2009, there were higher gains in science with an increase of 2.2 in NCEs. However, these gains were less than the comparison group’s gains.

**Recommendations**

1. The A²TeaMS provides professional development training for secondary mathematics and science teachers in HISD. Both administrators and teachers who participated this year were pleased with the training and coaching process. This high level of satisfaction could lead to increased participation in year three.

2. Moderate gains were demonstrated in the pre-test and post-test assessments for mathematics and science teachers who had both a pre-test and post-test assessment. Completing the next year of training could produce larger increases for teachers on the content assessments.

3. Slight to modest gains in Stanford scores of students taught by A²TeaMS teachers were achieved. This is the initial year of the A²TeaMS program. Teachers may need to complete the full three year training to demonstrate improvements in test scores of students. These same students should be tracked in 2009–2010 to see if additional gains are achieved in students taught by A²TeaMS teachers.
Introduction

Program Description

The Houston Independent School District (HISD), in partnership with Rice University, provided intensive professional development through the HISD/Rice Model Science Labs. The Rice Model Science lab program was designed to train twelve secondary science teachers per year in a setting removed from their home school. By expanding the HISD/Rice Model Science Labs, the Academy of Accomplished Teaching in Mathematics and Science (A^2TeaMS) was developed. A^2TeaMS provided ongoing professional development in content, pedagogy and leadership in mathematics and science for many secondary teachers within the district. The purpose of the A^2TeaMS was to expand upon the methods of the Model Science Lab program, by reaching a greater number of mathematics and science teachers. The daily practice of the teachers was embedded with the A^2TeaMS approach. For the 2008–2009 school year, A^2TeaMS maintained five program goals, which are as follows:

- Create a learning organization that provided a coordinated, systematic, district-wide opportunity for consistent on-going mathematics and science professional development on a large scale.
- Increase mathematics and science content and pedagogy knowledge of participating teachers as evidenced by rigorous, inquiry-based lessons aligned with the district curriculum, including natural mathematics-science connections.
- Increase student achievement in mathematics and science with a focus on student college readiness.
- Ensure the written curriculum is taught in the classroom.
- Increase administrators’ knowledge of best practices and ability to assess and support best practices in mathematics and science.

Moreover, the approach used in A^2TeaMS required that teachers were paired with A^2TeaMS staff and teams of secondary teachers to strengthen the academic programs at each participating school.

Program Personnel

For the 2008–2009 school year, the A^2TeaMS staff facilitated all professional development of the A^2TeaMS teachers and provided support in the classroom. Responsibilities of the A^2TeaMS staff included coordinating training; conducting monthly school visits to provide support to teachers; coaching A^2TeaMS teachers in the implementation of appropriate content and pedagogy; and collecting data on the effectiveness of the implementation of best practices. Throughout the year, A^2TeaMS staff provided support in mathematics and science that was unique and based on each campus’ needs. School administrators, regional specialists, and managers attended both the teacher and administrative A^2TeaMS workshops.

Academy Partners

Professional development for the A^2TeaMS participants focused on content, pedagogy, and effective coaching strategies. All materials utilized in A^2TeaMS training materials were aligned with the Texas Essential Knowledge and Skills and HISD Horizontal Alignment Planning Guides. Academy partners also assisted with the development of the on-line component of A^2TeaMS. Additionally, universities and other educational entities supported A^2TeaMS training by providing professional development opportunities and contributing graduate credit. This innovative approach allowed teachers to collaborate with others, store information, and share resources.
Funding

The proposed five-year budget was $10,423,980. Based on current funding, an annual contribution from the Mathematics Department including General Funds and grant funds could total $150,000. It should be noted that these funds could not be used to fund additional staff. An annual contribution from the Science Department including from General Funds and grant funds could total an estimated $1,000,000. Based on these figures, the last year’s funds were sufficient for meeting the needs of year one of the A²TeaMS budget. An additional $4,673,980 would need to be secured over the next five years to fully fund the program.

Purpose of the Evaluation

The purpose of the evaluation was to assess if A²TeaMS was effective in meeting the unique needs of each participating teacher and school. Therefore, it was necessary to collect information about the training process. Additionally, it was necessary to evaluate the performance and perceptions of the teachers who attended the trainings. Administrators were also asked about their perceptions of the A²TeaMS process. The following questions were addressed:

1. How was the A²TeaMS program structured in 2008–2009?
2. How were teachers performing on the walk-through observations?
3. How did teachers perform on pre-test and post-test assessments?
4. What were teachers’ level of satisfaction with A²TeaMS?
5. What were administrators’ level of satisfaction with A²TeaMS?
6. How did students of A²TeaMS-trained teachers perform on standardized tests?

Review of Literature

Effective professional development is not a passive, static process but a reflective and engaging activity that fosters teams, encourages professional development, and moves teachers toward success (Chappuis, Chappuis, Stiggins, 2009). A new way of conceptualizing learning is the team model, which requires teachers to commit to working and learning during and between team meetings (Chappuis, Chappuis, Stiggins, 2009). A more successful model of professional development is established that improves practices by emphasizing the career-long process of learning. Teacher incentives become a secondary support to the process of teacher-as-learner (Chappuis, Chappuis, Stiggins, 2009). These professional development programs were created to focus on the concrete tasks of teaching through assessment, observation, and reflection (Darling-Hammond & McLaughlin, 1995). A new paradigm is emerging in education that moves towards improving teacher learning opportunities so teachers stay informed of educational advancements (Hawley & Valli, 1999). The National Staff Development Council has created Standards for Staff Development that include organizing adult learners into learning communities, aligning goals with the schools, and developing collaborative efforts to deepen content knowledge (Wei, Darling-Hammond, Andree, Richardson, & Orphanos 2009). Professional development that is sustained and intense has a greater chance of transforming teaching practices and student learning. Additionally, job-embedded models of support appear to have more of an impact on practice than the traditional model of workshop training (Wei, Darling-Hammond, Andree, Richardson, & Orphanos 2009).

Methods

Data Collection

There were three primary populations assessed for this evaluation. First, qualitative data of administrators and teachers examined levels of satisfaction with A²TeaMS. These assessments addressed the perceptions of administrators and teachers regarding professional development sessions.
Administrators received surveys at program meetings with the A²TeaMS staff during the spring semester. Teachers received surveys during the entire 2008–2009 school year.

Qualitative data were collected to determine how teachers were performing based on walk-through observations. A²TeaMS staff observed teachers throughout the school year and the data were recorded in a uniform manner. Additionally, pre-test and post-test knowledge-based assessments were conducted to determine if any improvements in content occurred. Pre-test data and post-test data for teachers were collected during the 2008–2009 academic year. Science teachers received a science knowledge-based assessment and mathematics teachers received a mathematics knowledge-based assessment. Each instrument was designed to assess if there was an increase in teachers’ content knowledge of the specific subjects.

Finally, TAKS and Stanford data were collected to analyze academic performance of students whose teachers participated in A²TeaMS. Student TAKS and Stanford data from spring 2008 and spring 2009 were collected to analyze the academic performance of students whose teachers participated in A²TeaMS. Only students with test results from both spring 2008 and spring 2009 were included in the analysis.

For TAKS analysis, only mathematics data were used because the mathematics section of the TAKS is administered every year. The science sections of the TAKS are not administered every year. A comparison group of students from the same schools was randomly selected from a list of students from participating A²TeaMS schools. However, these students did not receive any instruction from A²TeaMS teachers. This was to compare students taught by A²TeaMS teachers to other students in the same schools.

Results

How was the A²TeaMS program structured in 2008–2009?

For year one, four A²TeaMS staff worked with 61 teachers across 36 middle and high school campuses (Appendix A). This resulted in a ratio of one A²TeaMS staff to eighteen teachers. For this cohort, the ratio of A²TeaMS staff to teachers was low. In an effort to maintain consistency throughout A²TeaMS trainings and coaching, staff worked with the same teachers throughout the year. This provided a personal, tailored program for each participating teacher. In 2008–2009, the staff to teacher ratio can increase. A²TeaMS staff was also available to campus administrators to provide support in mathematics and science instruction and to address issues in training unique to each campus. In addition, staff worked under the direction of the Secondary Curriculum, Instruction, and Assessment Department. Furthermore, A²TeaMS staff coordinated with mathematics and science personnel at the regional offices.

Teachers participated in professional development during the summer, followed by one full-day workshop each month and a two-hour training session after the normal school day each month of the school year. Additionally, two Saturday sessions were required. The program is a three-year commitment and requires that individual teachers learn in a progressive and structured manner. This year, 140 training hours were offered. In addition to coordinating professional development, A²TeaMS staff supported teachers in the implementation of best practices through on site coaching.

The A²TeaMS was designed so that each teacher participates for three consecutive years. During year one, the focus is on content and pedagogy. Year two focuses on making mathematics-science connections and increasing leadership skills. Finally, in year three, the A²TeaMS staff will help teachers to analyze their practices through action research. By the third year of the program, each participating school should have a team of six teachers in the A²TeaMS, consisting of a mathematics and science teacher at each grade level. Table 1 (page 7) presents three cohorts of professional development for this year and the next two years. This was the beginning of the program and so participating teachers were involved in activities and training focused on content and pedagogy.
In 2008–2009, A²TeaMS gave teachers a theoretical understanding of concepts and pedagogy, followed by multiple demonstrations, and opportunities to practice new skills. These opportunities to practice new skills supported teachers so that these skills could be fully integrated into their teaching repertoire.

A²TeaMS teachers were encouraged to use the methods modeled in the professional development sessions immediately and frequently in their classrooms. Additionally, teachers were organized into study teams for sharing, observing and coaching.

A²TeaMS defined what their program addressed in year one.

- A²TeaMS was based on existing curriculum. The content focus for each group of participating teachers was aligned with the existing HISD curriculum documents, bringing together mathematics and science teachers to align instruction between content areas. Teachers were able to make connections to strengthen their understanding of both mathematics and science. Mathematics teachers made connections to science, while science teachers were able to apply mathematics at appropriate levels.

- A²TeaMS is an on-going professional development program. Teachers participating in year one will continue through year three. Each year, two additional teachers join from each school. This creates a team of six teachers at each school by year three. Collaboration across grade levels and between content creates effective teaching practices. A²TeaMS program staff visited each classroom monthly and assisted in the application of the content and pedagogy learned in the training sessions.

- A²TeaMS worked with teachers between the level of novice and expert. A²TeaMS provided a support system where teachers can continue to develop their content and pedagogy knowledge.

Additionally, each teacher participating in the A²TeaMS during the 2008–2009 year was able to create and maintain a portfolio to illustrate individual growth over the course of the year. This gave both teachers and A²TeaMS staff a way of personalizing individual teaching goals and a synthesis of skills developed over the school year. Portfolios allowed teachers to demonstrate individual growth and understanding of the material presented through A²TeaMS.

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**Table 1: A²TeaMS Professional Development by Year, 2008–2013**

<table>
<thead>
<tr>
<th>School Year</th>
<th>Cohort 1</th>
<th>Cohort 2</th>
<th>Cohort 3</th>
<th>Cohort 1</th>
<th>Cohort 2</th>
<th>Cohort 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008–2009</td>
<td>Math Content &amp; Pedagogy</td>
<td>Math Content &amp; Pedagogy</td>
<td>Math Content &amp; Pedagogy</td>
<td>Science Content &amp; Pedagogy</td>
<td>Science Content &amp; Pedagogy</td>
<td>Science Content &amp; Pedagogy</td>
</tr>
<tr>
<td>2009–2010</td>
<td>Content Connections &amp; Leadership</td>
<td>Math Content &amp; Pedagogy</td>
<td>Applications &amp; Action Research</td>
<td>Science Content &amp; Pedagogy</td>
<td>Science Content &amp; Pedagogy</td>
<td></td>
</tr>
<tr>
<td>2010–2011</td>
<td>Applications &amp; Action Research</td>
<td>Content Connections &amp; Leadership</td>
<td>Math Content &amp; Pedagogy</td>
<td>Applications &amp; Action Research</td>
<td>Science Content &amp; Pedagogy</td>
<td>Content Connections &amp; Leadership</td>
</tr>
<tr>
<td>2011–2012</td>
<td>Applications &amp; Action Research</td>
<td>Content Connections &amp; Leadership</td>
<td>Applications &amp; Action Research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012–2013</td>
<td>Applications &amp; Action Research</td>
<td>Applications &amp; Action Research</td>
<td>Applications &amp; Action Research</td>
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</table>
Table 2: A²TeaMS Training Objectives in Classroom: Walk-Through Assessments

<table>
<thead>
<tr>
<th>A²TeaMS Walk-Through Assessments</th>
<th>Percent of Classrooms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearly Posted Objective</td>
<td>76</td>
</tr>
<tr>
<td>Aligned with HAPG</td>
<td>22</td>
</tr>
<tr>
<td>Instruction/Student Work Aligned With Objective</td>
<td>42</td>
</tr>
<tr>
<td>Students Aware of Learning Goal</td>
<td>52</td>
</tr>
<tr>
<td>Mathematics/Science Connections</td>
<td>21</td>
</tr>
<tr>
<td>Real Life Connections</td>
<td>31</td>
</tr>
<tr>
<td>Technology Resources</td>
<td>44</td>
</tr>
<tr>
<td>Manipulative/Hands-On Material</td>
<td>27</td>
</tr>
<tr>
<td>Resources Appropriate for Objective</td>
<td>33</td>
</tr>
</tbody>
</table>

Table 3: Walk-Through Assessment: Teaching Strategy - 5E Lesson Model

<table>
<thead>
<tr>
<th>5E Lesson Model</th>
<th>Number of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage</td>
<td>8</td>
</tr>
<tr>
<td>Explore</td>
<td>13</td>
</tr>
<tr>
<td>Explain</td>
<td>48</td>
</tr>
<tr>
<td>Elaborate</td>
<td>13</td>
</tr>
<tr>
<td>Evaluate</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 4: Walk-Through Assessment: Teaching Strategy - Marzano Strategies

<table>
<thead>
<tr>
<th>Marzano Strategies</th>
<th>Number of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Similarities and Differences</td>
<td>24</td>
</tr>
<tr>
<td>Cooperative Learning</td>
<td>19</td>
</tr>
<tr>
<td>Summarization and Note-Taking</td>
<td>11</td>
</tr>
<tr>
<td>Setting Objectives/Providing Feedback</td>
<td>8</td>
</tr>
<tr>
<td>Reinforce Effort/Recognition</td>
<td>7</td>
</tr>
<tr>
<td>Generating and Testing Hypothesis</td>
<td>4</td>
</tr>
<tr>
<td>Homework and Practice</td>
<td>10</td>
</tr>
<tr>
<td>Cues, Questions and Advance Organizers</td>
<td>12</td>
</tr>
<tr>
<td>Non-Linguistic Representations</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 5: Walk-Through Assessment: Teaching Strategy - Bloom’s Taxonomy

<table>
<thead>
<tr>
<th>Learning Domains</th>
<th>Number of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>46</td>
</tr>
<tr>
<td>Apply</td>
<td>41</td>
</tr>
<tr>
<td>Understand</td>
<td>45</td>
</tr>
<tr>
<td>Analyze</td>
<td>22</td>
</tr>
<tr>
<td>Evaluate</td>
<td>4</td>
</tr>
<tr>
<td>Create</td>
<td>3</td>
</tr>
</tbody>
</table>

How were teachers performing on the walk-through observations?

A²TeaMS staff conducted walk-through observations at the end of the school year to assess classroom organization and teaching. Table 2 shows important and relevant A²TeaMS objectives that were covered during the training process. These observations assisted A²TeaMS staff with tailoring the training for individual teachers. In 76 percent of observations, teachers had “clearly posted objective” and in 52 percent of observations students were “aware of learning goal.” However, “mathematics/science connections” was only observed 21 percent of the time. These observations assisted the A²TeaMS staff with tailoring the training to for individual teachers. In 76 percent of observations, teachers had “clearly posted objective” and in 52 percent of observations indicated that “students were aware of learning goals.”
Additionally, A²TeaMS staff observed teaching strategies and teacher engagement in the classroom. A²TeaMS stressed three types of teaching strategies during the course of the school year. This integrative approach maximized student learning by providing multiple models for student learning. They were the 5E Lesson Model (Engagement, Exploration, Explanation, Elaboration, and Evaluation), the Marzano Strategies, and Bloom’s Taxonomy. A²TeaMS chose these strategies due to proven educational benefits to student learning.

The first strategy presented was the 5E Lesson Model in Table 3. A total of 96 observations were recorded by A²TeaMS staff. A²TeaMS teachers tended to focus on explaining with 48 observations followed by exploring and elaborating, both with 13 observations.

Next, the Marzano strategies for classroom instruction were recorded. Table 4 presents this data. Marzano Strategies help students across grade levels and content areas. A²TeaMS teachers seemed to do best with Non-Linguistic Representations (25 observations) followed by Similarities and Differences (24 observations). These observations will assist A²TeaMS staff in developing training for teachers participating in the 2009–2010 training.

A²TeaMS staff observed teachers’ use of Bloom’s Taxonomy. Table 5 presents these results. The hierarchy of Bloom’s Taxonomy is widely accepted in educational arenas. Teachers guide students through cognitive learning processes. At the base of Bloom’s Taxonomy are simple knowledge-based recall questions. Building up through this foundation, teachers ask students increasingly challenging questions in an effort to test their comprehension of presented material. With Bloom’s Taxonomy, A²TeaMS teachers tended to participate most in remembering (46 observations) and understanding (45 observations).

**How did teachers perform on pre-test and post-test assessments?**

To assess the improvement in subject matter content knowledge, teachers participating in the A²TeaMS training were administered a pre-test and post-test. The pre-test was given prior to any teacher participating in training or coaching. A post-test was administered after completion of all A²TeaMS training and coaching. Science teachers received a science knowledge-based assessment and mathematics teachers received a mathematics knowledge-based assessment. Each instrument was designed to assess if there was an increase in teachers’ content knowledge of the specific subjects, either science or mathematics.

A combined total of 29 mathematics and science teachers took both the pre-test and post-test instruments allowing for a paired t-test to be conducted. This analysis was conducted to assess if any statistically significant improvements in tests scores were made. Fifteen science teachers and 14 mathematics teachers took both assessments.

- Overall, teachers improved 2.5 points on the assessments, which was a statistically significant increase (p<.05). Teachers could earn a total of 40 points on the science or mathematics knowledge-based assessments.
- Specifically, mathematics teachers improved 3.2 points from pre-test to post-test. This was a statistically significant improvement (p<.05).
- Science teachers demonstrated an improvement of 1.9 points from pre-test to post-test, and this was a statistically significant increase (p<.01).

Due to the low number of teachers available for pre-test and post-test data, specific item analysis of the assessments will not be presented in this report. Reporting those data would compromise the confidentiality of the teachers who participated in the pre-test and post-test assessments.
Table 6: Teachers’ Level of Satisfaction with A²TeaMS

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree %</th>
<th>Disagree %</th>
<th>Agree %</th>
<th>Strongly Agree %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructors were prepared and organized.</td>
<td>1.7</td>
<td>0</td>
<td>17.4</td>
<td>80.9</td>
</tr>
<tr>
<td>I was actively engaged and involved.</td>
<td>1.7</td>
<td>.5</td>
<td>27.0</td>
<td>70.7</td>
</tr>
<tr>
<td>The activities and strategies were appropriate and helped me understand the session content.</td>
<td>1.7</td>
<td>2.0</td>
<td>26.2</td>
<td>70.1</td>
</tr>
<tr>
<td>Instructors were knowledgeable.</td>
<td>1.7</td>
<td>0</td>
<td>11.7</td>
<td>86.6</td>
</tr>
<tr>
<td>Instructors were respectful of people’s ideas.</td>
<td>2.0</td>
<td>0</td>
<td>12.7</td>
<td>85.4</td>
</tr>
<tr>
<td>I deepened my understanding of appropriate pedagogy.</td>
<td>1.3</td>
<td>2.4</td>
<td>32.0</td>
<td>64.3</td>
</tr>
<tr>
<td>My instructors provided practical strategies for implementation in my classroom.</td>
<td>1.6</td>
<td>2.6</td>
<td>27.5</td>
<td>68.3</td>
</tr>
<tr>
<td>I am looking forward to coming back to future sessions.</td>
<td>1.6</td>
<td>.5</td>
<td>14.0</td>
<td>83.9</td>
</tr>
</tbody>
</table>

What were teachers’ level of satisfaction with A²TeaMS?

Teachers participated in multiple satisfaction surveys during the school year. Teachers received surveys after each training session. This was to assess teachers’ level of satisfaction of each training session. Therefore, individual teachers responded multiple times by completing multiple surveys. A four-point Likert scale was used to format the survey. This coding system was as follows: “Strongly agree” = 4, “Agree” = 3, “Disagree” = 2, and “Strongly Disagree” = 1. Table 6 (page 9) highlights the responses (in percentages) of the first-cohort of teachers’ level of satisfaction with participation in A²TeaMS trainings. On a four-point scale, teachers reported an overall satisfaction level of 3.75 for all items combined. For the item, “Instructors were knowledgeable,” 98.3 percent of respondents strongly agreed or agreed with this statement. Additionally, responses indicated that instructors were respectful of people’s ideas (85.4 percent “strongly agree” and 12.7 percent “agree”). Over 97.9 percent of respondents were looking forward to coming back in the future. Most teachers’ responses indicated that they were pleased with their participation in A²TeaMS.

What were administrators’ level of satisfaction with A²TeaMS?

Eleven administrators participated in a survey administered during the spring semester of 2009. A four-point Likert scale was used to develop the survey. This coding system was as follows: “Strongly agree” = 4, “Agree” = 3, “Disagree” = 2, and “Strongly Disagree” = 1. Table 7 (page 11) highlights the responses (in percentages) of the first-year administrators’ level of satisfaction with participation in A²TeaMS. Participants in the survey included: five middle school administrators, two high school administrators, two regional office administrators, one middle and high school administrator and one administrator did not report his or her school level.
<table>
<thead>
<tr>
<th>Table 7: Administrators’ Level of Satisfaction with A²TeaMS in Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree %</td>
</tr>
<tr>
<td>Coaches provide support to my campus.</td>
</tr>
<tr>
<td>Coaching benefits our teachers.</td>
</tr>
<tr>
<td>Coaches are respectful of administrator’s requests.</td>
</tr>
<tr>
<td>I have observed teachers using new instructional strategies as a result of A²TeaMS. (Interactive Notebooks, 5E Lesson Plan, Kagan Strategies).</td>
</tr>
<tr>
<td>A²TeaMS helps teachers consistently use the TEKS and/or HAPG curriculum.</td>
</tr>
<tr>
<td>A²TeaMS helps my teachers make mathematics/science connections in the classroom.</td>
</tr>
<tr>
<td>This program has helped teachers to engage students during instructional time.</td>
</tr>
<tr>
<td>A²TeaMS provide quality professional development for teachers.</td>
</tr>
<tr>
<td>Teachers’ time in professional development produces positive results.</td>
</tr>
<tr>
<td>Participating in A²TeaMS has been a positive experience for teachers.</td>
</tr>
<tr>
<td>I have taken advantage of the resources provided by the program.</td>
</tr>
<tr>
<td>I plan to have teachers participate next year.</td>
</tr>
<tr>
<td>I would you recommend A²TeaMS to a colleague.</td>
</tr>
</tbody>
</table>

On a four-point scale, administrators’ total level of satisfaction with the A²TeaMS program was 3.67 for all items combined. There were only two items where at least one administrator expressed disagreement and these items were: “A²TeaMS helps teachers consistently use the TEKS and/or HAPG,” (10 percent) and “A²TeaMS helps my teachers make mathematics/science connections in the classroom” (10 percent). All administrators agreed or strongly agreed with other survey items. The survey items with the strongest level of agreement were: “I would recommend A²TeaMS to a colleague” (90.9 percent), “I have taken advantage of the resources provided by the program” (90.0 percent), “I plan to have teachers participate next year” (81.8 percent), “Participating in A²TeaMS has been a positive experience for
How did students of A²TeaMS-trained teachers perform on standardized tests?

Student TAKS and Stanford data from spring 2008 and spring 2009 were collected to analyze the academic performance of students whose teachers participated in A²TeaMS. Only students with test results from both spring 2008 and spring 2009 were included in the analysis.

For TAKS analysis, only mathematics data were used because the mathematics section of the TAKS is administered every year. The science sections of the TAKS are not administered every year. Students needed to take the mathematics section of the TAKS in spring 2008 and spring 2009 to be included in the analysis. Additionally, to be included in the analysis, students needed to be taught by an A²TeaMS teacher in 2008–2009. There were 4,647 students who were taught by A²TeaMS teachers who met this criteria.

Additional analysis compared a sample group of students from the same schools to students of A²TeaMS teachers. These students were not taught by teachers participating in A²TeaMS. This group was randomly selected from a list of students from participating A²TeaMS schools, however, these students did not receive any instruction from A²TeaMS teachers. There were 2,607 students who took the mathematics TAKS in spring 2008 and spring 2009 who comprised the comparison group.

For the 2008–2009 school year, students of A²TeaMS teachers showed comparable mathematics TAKS scores to students of non-A²TeaMS teachers. Students of A²TeaMS teachers did not demonstrate an increase in the percent that met the passing standards on the mathematics sections of the test. In mathematics, in spring 2008, 70.5 percent of these students met the standard for passing. After being taught by A²TeaMS teachers, TAKS data from spring 2009 revealed that 67.8 percent of these students met the standard. There was a slight increase in the number of commended students from 2008 to 2009. These results are presented in Table 8. The comparison students achieved a passing rate of 67.9 percent in 2008 and 68.8 percent in 2009. The percent of commended students increased slightly from 18.2 percent in 2008 to 18.3 percent in 2009 on the mathematics section of the TAKS.

With the Stanford Achievement Test, 5,064 students of A²TeaMS teachers took both the spring 2008 and spring 2009 test. For the comparison group, 2,934 students in the same schools took the spring 2008 and spring 2009 Stanford Achievement Test. Students of A²TeaMS showed slight improvement from spring 2008 to spring 2009. Table 9 (page 13) presents these results. There was a slight increase of 0.5 in mathematics NCE scores for both the treatment and comparison group of students. In science, there were higher gains from 2008 to 2009, with an increase of 2.2 NCEs. Students of A²TeaMS teachers are showing some improvement on Stanford results from 2008 to 2009, although not to the same extent as students in the comparison group.

<table>
<thead>
<tr>
<th>Table 8: TAKS Mathematics Rates</th>
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<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Students with A²TeaMS Teachers</td>
</tr>
<tr>
<td>Comparison Sample of Regular Students</td>
</tr>
</tbody>
</table>
With regards to Stanford mathematics and science data, students of A²TeaMS teachers performed similarly to students of non-A²TeaMS teachers. Both groups showed a moderate increase in test scores from spring 2008 to spring 2009. Students without A²TeaMS teachers improved 0.5 NCEs in mathematics and 3.3 NCE points in science. Both groups of students demonstrated modest increases in Stanford test scores.

### Discussion

The A²TeaMS program has provided the initial cohort of teachers ongoing professional development in content, pedagogy and leadership in mathematics and science. For the 2008–2009 school year, the A²TeaMS approach was paired with coaching for teams of secondary teachers, thereby strengthening the academic program at each participating school. Given the positive reflections on satisfaction surveys from teachers and administrators about the A²TeaMS, it is evident both teachers and administrators value participation in the program. Creating a learning organization that provides a coordinated, systematic, district-wide opportunity for consistent mathematics and science professional development does appear possible on a large scale within HISD.

Additionally, program components including mentoring, coaching and training have helped this first cohort increase their knowledge of subject matter content knowledge based on the pre-test and post-test data. Students of A²TeaMS teachers showed modest improvements on Stanford Mathematics and Science data. Since this is the initial year of the A²TeaMS program, additional years of teacher training may be needed to demonstrate improvements in test scores of students.

Teachers participating in A²TeaMS volunteered to participate in the teacher-training program. While their students did not show large gains in test scores, these students did not show any decrease in performance. It is possible that these students would have had declining test scores without their teachers participating in A²TeaMS. Another consideration is that A²TeaMS experienced a change in leadership during the 2008–2009 school year. This could have impacted service delivery of training.

### Recommendations

1. The A²TeaMS provides professional development training for secondary mathematics and science teachers in HISD. Both administrators and teachers who participated this year were pleased with the training and coaching process. This high level of satisfaction could lead to increased participation in year three.
2. Moderate gains were demonstrated in the pre-test and post-test assessments for mathematics and science teachers who had both a pre-test and post-test assessment. Completing the next year of training could produce larger increases for teachers on the content assessments.

3. Slight to modest gains in Stanford scores of students taught by A²TeaMS teachers were achieved. This is the initial year of the A²TeaMS program. Teachers may need to complete the full three year training to demonstrate improvements in test scores of students. These same students should be tracked in 2009–2010 to see if additional gains are achieved in students taught by A²TeaMS teachers.

References


### APPENDIX A
List of Schools Participating in A²TeaMS for 2008–2009

<table>
<thead>
<tr>
<th>Region</th>
<th>Schools</th>
</tr>
</thead>
</table>
| Alternative | CEP Southeast  
CEP Southwest  
Contemporary Learning Center |
| Central | Black Middle School  
Clifton Middle School  
Cullen Middle School  
LECJ High School  
Reagan High School  
Rice School  
Ryan Middle School  
Waltrip High School |
| East | Chavez High School  
Eastwood Academy High School  
Edison Middle School  
Jackson Middle School |
| North | Burbank Middle School  
Davis High School  
Fleming Middle School  
Henry Middle School  
Kashmere High School  
Key Middle School  
Marshall Middle School  
McReynolds Middle School  
Smith Middle School  
Wheatley High School  
Williams Middle School |
| South | Carnegie Vanguard High School  
Dowling Middle School  
Empowerment High School  
Madison High School |
| West | Bellaire High School  
Lee High School  
Revere Middle School  
Sharpstown High School  
Welch Middle School  
Westbury High School |