

Math Science Partnership (MSP) Program: Title II, Part B

**ROCKDALE COUNTY MSP GRANT
ANNUAL EVALUATION REPORT: YEAR TWO**

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Key Findings

Retention: Although some teachers left the MASTERS program at the beginning of Year 2, new participants were added, resulting in an 89% retention rate.

Professional Development: Teachers consistently ranked the professional development activities as “successful”.

Science Teacher Content Knowledge: Teachers in the 7th Grade Life Science cohort significantly increased their content knowledge during Year 1.

During Year 1 of the program, 38% of 8th Grade Physical Science teachers demonstrated significant increases in their content knowledge.

High School Biology teachers made significant gains in their content knowledge during Years 1 and 2 of the program.

Math Teacher Content Knowledge: The middle school math cohort showed significant gains between Years 1 and 2 of the program in Algebra and Geometry.

The High School Mathematics cohort did not demonstrate any significant gains during the program.

Student Achievement: 7th and 8th grade students from 24 of the 32 science classes outperformed their respective district on the CRCT. Students in 22 of these same 32 classes performed better than all students in the state of Georgia.

29% of students of teachers in the middle school math cohort outperformed their respective school district.

High School Math students from 13 of the 28 math classes outperformed their respective district on in the EOCT. 7 of these same classes scored higher than all students in Georgia.

EXECUTIVE SUMMARY

This evaluation report presents findings for the 2009 to 2011 Rockdale/Newton County MSP MASTERS program. The goal of this evaluation is to determine the effectiveness of professional development for science and mathematics teachers in the targeted counties. The purpose of this analysis is to identify any where there is any significant increase in teacher content knowledge or not, to assess teacher satisfaction with the professional development they received through the program, and to determine what impact the teacher’s professional development had on student achievement. The detailed results of the evaluation can be found in the Findings section.

The following are some highlights of the report findings:

94% of all teachers surveyed strongly agreed or agreed that the 2009 to 2011 MSP program further developed their knowledge, skills, and interests.

The only cohort that exhibited significant gains in content knowledge throughout the duration of the program was the High School Biology cohort. All teachers were tested three times between Years 1 and 2. Between the pre-test and mid-point test, 43% of H.S. Biology teachers exhibited significant gains. Comparing the mid-point test to the post-test, 33% significantly increased their content knowledge. 40% showed significant gains between the pre-test and post-test.

Students of participating MSP teachers in several cohorts scored higher than the district and state averages on the CRCT.

Introduction

This report provides an evaluation of the second year of implementation for the Rockdale-Newton Math and Science Teachers Enhancing Rigor for Students (MASTERS) Program. The MASTERS program is a Math Science Partnership (MSP) Grant Program that is based on a partnership between Rockdale County Public Schools (RCPS) and Newton County Schools (NCS) with the Georgia Tech Center for Education Integrating Science, Mathematics, and Computing (CEISMC). The partnerships help create quality and sustained professional development, with the ultimate goal of increasing student achievement.

The MASTERS program takes a comprehensive approach to improving student achievement in grades 7-12 by enhancing the content knowledge and teaching skills of mathematics and science teachers. This is achieved by building a coherent and focused program of activities, which are vertically integrated across instructional levels. To specifically address the needs of these teachers, six teacher cohorts were created based on grade level and subject area. The MASTERS program consists of the following cohorts:

- High School Mathematics (Math I and Math II teachers)
- High School Biology
- High School Physical Science
- 7th Grade Life Science
- 8th Grade Physical Science
- 8th Grade Mathematics

Four of the cohorts (7th Grade Life Science, HS Physical Science, HS Biology, and HS Math) are engaged in experiential learning using inquiry-based, hands-on activities to explore the content and concepts addressed in the Georgia Performance Standards for their respective content areas and grade levels. The remaining two cohorts (8th Grade Physical Science and 8th Grade Math) are involved in the Japanese Lesson Study Model, which is being utilized as a guide to affect instructional change among the participating teachers.

As the program administrators, RCPS has partnered with CEISMC for instructional support. The neighboring district, Newton County Schools, is also partnering in the grant by recruiting teachers to participate in the professional development being offered as a result of the MASTERS program. Additionally, the evaluation team from CEISMC is serving as the official external evaluator for the overall grant program.

The long-term goals of this program are 1) to eliminate achievement gaps in science and mathematics for grades 6-12 in all subgroups, and 2) to build a system which ensures the selection, development, and career-long support of high quality mathematics and science teachers. More specifically, the following goals were outlined in the original program proposal:

- Advance mathematics and science content knowledge, pedagogical content acumen, and cognitive disciplinary skills of teachers;
- Increase the number of students meeting and exceeding scores on CRCT and EOCT in Math and Science;
- Ensure all students have access to, are prepared for, and are encouraged to succeed in challenging and advanced mathematics and science courses.

The Participants

Although the grant proposal projected serving 100 teachers in Year 1, the total number of participants initially enrolled in all six cohorts was 90. At the end of Year 1, 82 participants remained. In fall of 2011, 30 new participants were added to the program, bringing the total to 122. However, 14 teachers dropped during Year 2. The final total for the number of enrolled participants in the MASTERS program is 99. Some teachers had discontinued their participation due to changes in teaching assignments and other professional commitments that interfered with their participation in the MASTERS program. Therefore, Year 2 of the MASTERS program resulted in an 89% retention rate of existing cohort members. Table 1 provides a breakdown of the teachers enrolled in Year 2 of the program, by content and level taught.

Table 1. Total teachers by content and level, Year 2

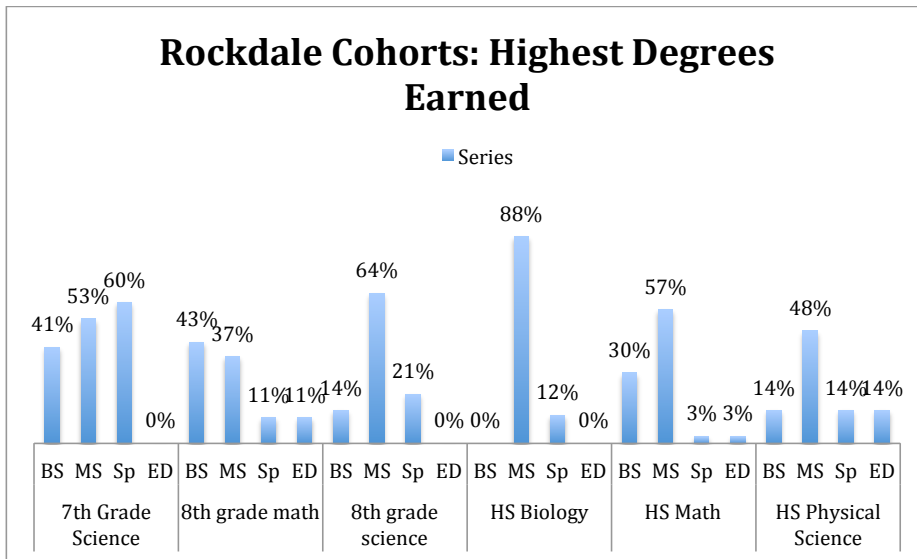
	Math	Science
Middle School	20	17
High School	32	27
Total	52	44

Due to the weakened economy and budget cuts, Rockdale and Newton County teachers have experienced changes in assignments and job losses.

Of the 99 teachers completing Year 2 of the grant, of them teach in regular education classroom positions, of them teach special education, are gifted teachers and teacher is classified as an ELL teacher. Demographic data regarding levels of education

and numbers of years of teaching experience was gathered from of the participating teachers. Figure 1 displays the education level of the cohort teachers.

Figure 1. Teachers' Level of Education



Tiffany Davis 7/25/11 4:47 PM
Comment [1]: Chris, I'm trying to figure out how to re-name this series. It will be fixed before I submit it.

Evaluation Methods

The evaluation plan utilizes a mixed-method design, which provides both formative and summative information. It emphasizes quantitative and qualitative data collection methods. The key evaluation question is “to what extent has the program improved teacher content knowledge and increased the number of students meeting and exceeding expectations on the CRCT and the EOCT in Math and Science?” Several key points serve as the focus for this evaluation:

- Evidence that a consistent cohort of teachers is being retained in the program

- Evidence that quality professional development, materials and support is being provided to cohort members
- Evidence of participants' satisfaction with the program
- Evidence of improved teacher content knowledge
- Evidence that the professional development is impacting classroom instruction through improved student achievement

A variety of data sources are used in this evaluation, including:

Attendance Sign-in Sheets

The CEISMC evaluation team provided sign-in sheets at each professional development session to track attendance throughout the grant's duration. Sign-in sheets were not only utilized to track attendance, but also to track stipends earned and perfect attendance bonuses. Recordkeeping was closely monitored by all members of the partnership team from the start of the grant.

Demographic Data Information Forms

New participants to the program were asked to complete demographic data information, including their names, schools, and the grade levels they were teaching. Administrators collected information about the number of years of teaching experience each participant had, as well as the participants' levels of education, their job classifications (i.e. Special Education, Regular Education, Title I, ELL, AP/IB, non-teaching coach, or paraprofessional), and an estimate of the number of students each teacher taught during the year. Teachers were given several opportunities to complete the demographic data forms and to verify that their information was correctly recorded. In spite of these efforts, data were not collected from all participating teachers.

Professional Development Feedback Forms

Similar to Year 1 of the grant, professional development feedback forms were given to participants at the conclusion of each training session in Year 2. Minimal changes were made to the feedback forms used in Year 2 (see Appendix A). Feedback forms were compiled and analyzed by the CEISMC evaluation team and an evaluation report was provided to the program directors and instructors to serve as formative feedback through Year 2 of the grant. Grant administrators and instructors utilized this feedback to make adjustments in the professional development to better meet the needs of the participants.

Teacher Pre & Post-tests

Each cohort was given a pre-test, a mid-point test, and a post-test based on their content area and grade level, per instructions from the Georgia Department of Education. The test scores were used to measure changes in participants' mathematics and science content knowledge. Table 2 outlines the teacher assessments given to each cohort in the program. The Misconceptions-Oriented Science Assessment Resources for Teachers (MOSART) is used in assessing the content knowledge of 8th Grade and High School Physical Science teachers. Since no MOSART assessment existed for High School Biology and 7th Grade Life Science, CEISMC staff worked with science instructors to develop assessments in those areas for the MSP program. In the content area of mathematics, Learning Mathematics for Teachers (LMT) project assessments were administered at three time points, serving as a pre-test, mid-point test and post-test. There are currently no high school LMT assessments. As a result, the Georgia Department of

Education commissioned the creation of an assessment developed specifically for the use with the MSP grants in the State of Georgia.

Table 2. Cohort Teacher Assessments

Cohort	Pre, Mid-Point, & Post-Test
HS Mathematics	Georgia DOE HS Math Assessment
HS Biology	CEISMC-developed Assessment
HS Physical Science	MOSART HS Chemistry MOSART HS Physics
7th Grade Life Science	CEISMC-developed Assessment
8th Grade Physical Science	MOSART MS Physical Science
8th Grade Mathematics	LMT MS Algebra LMT MS Geometry

Two procedures were followed for the scoring of tests. Tests developed at CEISMC were scored at Georgia Tech, and the results were recorded and reported to the grant administrator. For the LMT and the MOSART tests, completed Scantron answer sheets were mailed to the GaDOE, and the results were analyzed and reported to the evaluator by email. All used test materials were properly destroyed and test results were maintained in a secure location.

Classroom Observations

The Rockdale County district personnel and coaches, as well as CEISMC program directors and Georgia Tech instructors, conducted classroom observations and visits.

General trends and observations were reported to the CEISMC evaluation team and will be discussed in the findings section of this report. Appendix B provides an example of the form utilized for teacher observations for the following cohorts: 7th Grade Life Science, High School Math, High School Physical Science, and High School Biology.

Student Achievement Data (CRCT & EOCT data)

In order to collect consistent and coordinated student achievement data on state standardized tests, the evaluation team sent formatted spreadsheets to administrators at Rockdale County Schools and Newton County Schools. Specifically, student scores on the Criterion-Referenced Competency Test (CRCT) were requested for the middle school mathematics and science teachers; and End-of-Course (EOCT) Math I, Math II, Biology, and Physical Science test scores were requested for the high school teachers participating in the program.

Findings: Teacher Impact

Quality Professional Development

Participant satisfaction with the professional development received in the MSP was assessed two ways: numerous items on a Likert Scale (from 1 “not at all” to 4 “to a great extent”) and several open-ended questions. The comments, which provide additional insight into the participants’ thoughts and reactions to the overall professional development experience, help further inform the quality of professional development being delivered. Results from the evaluations show that 8th grade Math teachers were least satisfied overall with the November 2, 2010 workshop. High School Math teachers expressed the least overall satisfaction with the December 7, 2010 workshop. The

September 11, 2010 workshop was least satisfying for 7th Grade Life Science teachers, while 8th Grade Science teachers were least satisfied with the 8th Grade Science workshop. High School Physical Science teachers were least satisfied overall with the September 11, 2010 workshop. Lastly, High School Biology teachers expressed the least overall satisfaction with the November 2, 2010 workshop.

The following comments represent a sample of the positive and negative feedback received about the professional development sessions.¹ In general, teachers enjoyed collaborating with other participants, identifying new resources or new ways to use existing resources, and experiencing hands-on activities. Participants were asked to respond to the following open-ended question:

Looking back at the course, what part has been most valuable to you?

8th Grade Math

- The resources used were, for the most part, familiar to me. It was very helpful for me to see new ways to use them.
- Vertical tasks challenged my thinking.
- Idea generation; series of common goals.
- I still like the activities to use in class. The most helpful thing that I got from today was the sharing of difficult strategies. Like tic-tac-toe integer rules for multiplication and division.
- Collaborating with other math teachers, and activities shared.
- I never thought about scientific notation couples. I will modify it to do on Monday in class. I will also add a few extensions to it. Thanks.
- Exposure to tasks. We saw a lot today. Links to websites. Exposure to videos.
- I learned a new way to come up with a formula to determine an equation for an exponential problem.
- The integration of mathematics and science. Allowing various tasks in different grade bands.

8th Grade Science

- Everything was great.
- Showing how to teach hands-on.

¹ These comments have been sparingly edited, only to correct obvious grammar or spelling errors.

- Actually completing GPS activities before trying with student.
- Unpacking the standards, actual experiments (content), discussion of lesson plans after teaching.
- Collaborating to plan a lesson.
- Unpacking the standards was helpful.

Science -- Life Science Course Feedback

- Classroom activities were relevant to what we teach in the 7th Grade Life Science classroom. Excellent speaker – wish we had more of those – with specific knowledge.
- I really enjoyed the guest speaker. I feel that this session opened my eyes to wonderful research that is taking place. I will share what I learned with my students.
- I really enjoyed the higher, difficult activities that I would never (probably) do with my students. The experience and exposure to those techniques and applications will help me show the kids how biology is used.
- The most valuable part has been being introduced to new methods that I can take back to the classroom and modify for my own use.
- I enjoyed learning about the body systems and will use the internet resource in my classroom.

Science -- High School Biology

- Teaching strategies for differentiation.
- Debriefing teachers provided suggestions to engage students and increase student learning.
- The collaboration with peers! Learned new instruction ideas.
- The web-site visited and technology sites.
- Sharing various lessons with my colleagues; these actually allowed me to gain a wealth of knowledge and resources.
- Increased content knowledge and discussion with cohort participants.
- Genetics scavenger hunt, a genetics game

Math -- High School Math I and II

- Having speakers with various backgrounds who tied in their expertise with mathematical modeling.
- Portion and GIFT Program – possibly of exploring applicable and practical experiences that can help transform classroom experiences for students.
- The ability to apply the information from the workshop to what I teach my students.
- Innovative ways of engaging students. Found ways of occupying students who complete their tasks in class with nothing else to do – it provides challenges.
- The whole was remarkable. Before today, I didn't know the sketch pad existed. Although the content was challenging, I was totally engaged because the

facilitators allowed time for me to think independently. Thereafter, I was permitted to explain and share my results with my partners.

- It was a great review of geometry. It also provided me with hands-on activities to use with my students. I also appreciate the instruction on the Geosketch. I like the way the instructors modeled the teaching strategies, too!
- Developing a three-part lesson plan. Provided methods to close summarize lesson to evaluate teacher effectiveness.
- Working on a lesson plan about a task and listening to task which I will be teaching

Science -- High School Physical Science

- I enjoyed the workshop pertaining to MRI. I also enjoyed the hands-on activities pertaining to magnetism (electromagnets, bar magnets, and horseshoe magnets)
- All of the parts of the workshop were beneficial to me.
- Some of the activities we did will be used in my classroom.
- Loved the lessons and ideals, loved the presenters – they were great – phenomenal actually.
- All hands-on activities.
- Today I felt like the class discussion over the way to teach the different math concepts was most valuable.
- The hands-on activities were most valuable. The fact that we were allowed to participate in the activities we were able to work through problems and develop some modifications.

Looking back at the course, what part has been least valuable to you?

8th Grade Science Course Feedback

- I enjoyed the paper museum, but I am not sure that I would have the opportunity to spend that much time on the process to tie it in with the standards I teach.
- I wished the speaker would have discussed the content that we are currently teaching to, then related it to the real world. I did see the connection to our standard, but I think overall it would have been better if he would have brought it “down” a few levels.
- Nothing—this week is great! Except I wish we could have gone by Newton Co. pacing guide. We won't teach cells until October.
- Journal reflections.
- SNP analysis, pharmacogenetics, Lick your rats - too difficult to apply to middle school children.

Science -- High School Biology

- None!
- I could use something from everything.

- Include background knowledge we do not have. This will give us a stronger grasp on the content with which to apply the activities provided.
- Quantitative Trait Activity – interesting, but not all that valuable to me.
- Not too much and I believe I can use something from all of the parts.
- Acting out cell biology – great information and extended my knowledge but can't use information.

Math -- High School Math I and II

- I enjoyed the activities, but I don't know how I could apply them to 9th grade standards.
- The level of math is way too high for my freshman.
- These workshops are tantamount to obtaining an endorsement in GPS math. It would be great if we could get an endorsement in GPS math via MSP training.
- The salt exercise would be too messy for my class.
- Completing a reflection. Some problems presented do not relate to the curriculum I am teaching or could use.
- None. I liked all of it.
- I can't think of any!
- Can't really see purpose of activities as they relate to my classes.
- Sometimes, I find that crossing the GPS standards for math with the standards for science can be confusing for my students.
- There was no direct connection with relating these tasks to my students. I find it difficult to do the tasks with a classroom full of 9th graders and keep them focused.
- Electrical circuits - already knew.
- Having teachers demonstrate tasks.
- Listening to tasks which I will not be teaching

8th Grade Math

- None!
- I'm still not sure exactly what a "lesson study" is.
- The partner with the high school. The activity was the worst and I didn't see the relevance.
- Meeting with the high school group. I really do not get anything from it.
- Vertical wins. Interesting but not useful. Thanks.
- Vertical alignment with high school.
- Being able to manipulate the calculators

Science -- High School Physical Science

- History of Newton
- 8-4 on Saturday is too long.
- A lot of it I already know – like lessons + new ideas were good. Don't spend so much time on math problems.

- I would have to say that everything was valuable, but some of the calculations would not be directly beneficial to my students. But they still helped me.
- PowerPoint.

Thinking back to your experiences with the 2009 to 2011 professional development workshops offered through the MSP program, what part of your experiences have been most valuable to you and why?

- This program has provided a plethora of resources that I use in my classroom. The collaboration with my colleague making new friends and sharing successful practices has been invaluable. The resources given, such as books and supplies, were thankfully received and appreciated.
- One valuable component has been to collaborate and share experiences with other teachers in the same subject & grade level. Also, the opportunity to be exposed to deeper background knowledge to take back to the classroom has been valuable. These activities are too advanced or involved to complete with my students however. I have been able to share that knowledge and relate meaningful activities or just better answer student questions.
- The networking with past participants and MSP staff was priceless. The relationships and shared knowledge reset my energy and enthusiasm. The observation process, especially when we teamed up, was a great experience.
- Workshop activities that deepened my content knowledge and that translated readily to middle school opportunities to observe peers in the classroom gave me a better perspective on what I do and could improve visits to GT campus to see current work and hear from researchers.
- Participation in MSP has increased my content knowledge—especially in the areas of genetics and evolution. I think this is because of the motivation, dedication and knowledge base of my instructors.

Thinking back to your experiences with the 2009 to 2011 professional development workshops offered through the MSP program, what part of your experiences have been least valuable to you and why?

- I found it very frustrating that the Newton City pacing was different than Rockdale. While I feel the Rockdale pacing is better for students, we had no choice. There were many activities I did not use; either we had already taught the standard or I forgot about them when we reached the standard. At times, I felt overwhelmed by the amount of activities and papers I accumulated; fewer good activities may have been better.
- I can't think of anything specific, but some of the labs were not valuable as a

teacher because they are impossible to implement in my classes. However, they were valuable for me personally to increase my content knowledge.

- The Lesson Study implementation was not feasible. The idea is great! I'm not too sure we would be able to use it in a normal school year.
- While the visits to GATech were great and the presentations by the professors exemplary, I had little I could take back to share with my students. Would love to have a student-friendly packet developed for sharing and to spark student interest.
- Some of the activities we did were interesting to me but there was no way my students would be able to do them or get anything out of them, too difficult and not appropriate for my students' abilities and interests.
- The vast majority of the scientific content (in an effort to integrate science with mathematics) was not taught in a way that I could understand. During these lectures, I found it very difficult to learn any helpful information.
- The experiences that were least valuable to me were none. This is the best workshop that I have ever attended.

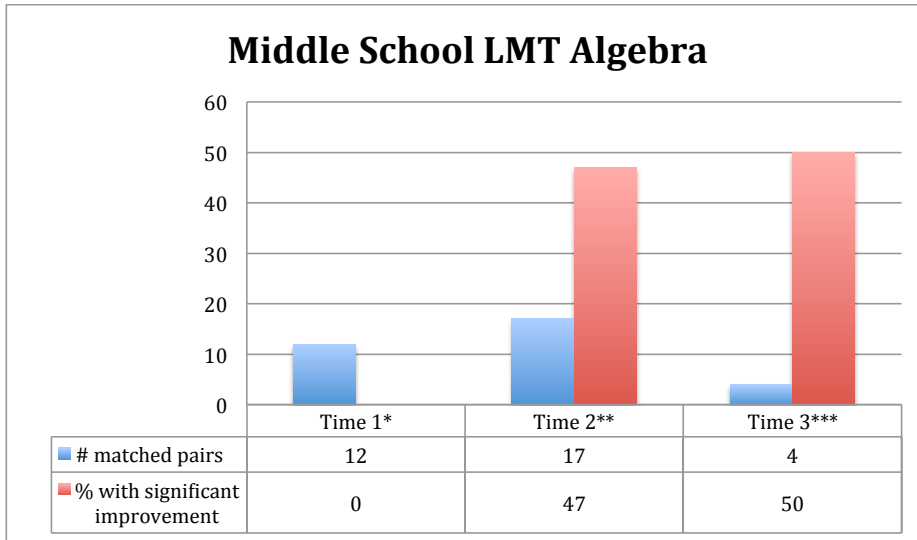
Math Teacher Content Knowledge

Participating math teachers were given a pre-test in the Summer of 2009, a mid-point test in Spring of 2010, and a post-test in the Spring of 2011. These tests were based on their content area and grade level. It should be noted that for all figures below, Time 1 represents a comparison between pre-test and mid-point test data, Time 2 represents a comparison between mid-point and post-test data, and Time 3 represents a comparison between pre-test and post-test data.

Algebra

50% of teachers significantly increased their score on the exam during Time 3, between the pre-test and the post-test (See Figure 2).

Figure 2. Years 1-2 Algebra Teacher Gains in Content Knowledge



* pre-test and mid-point test

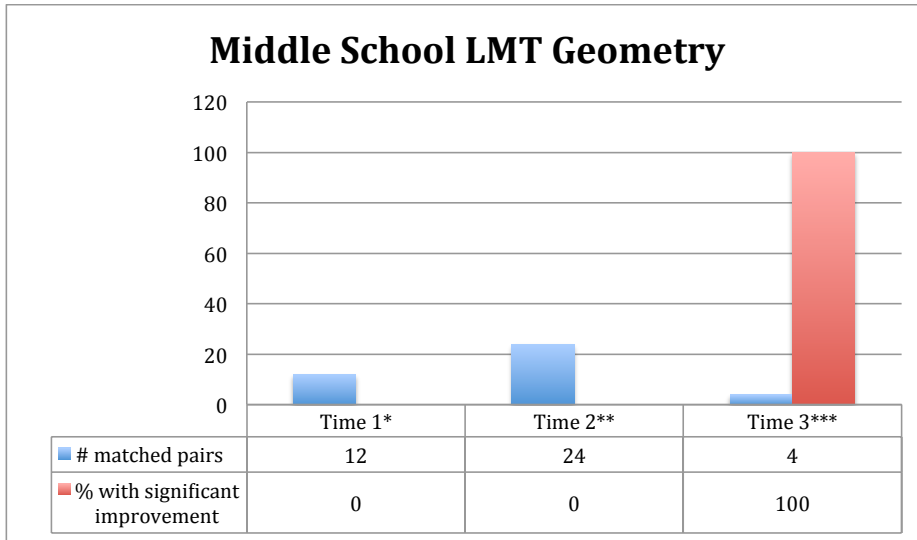
**mid-point test and post-test

***pre-test and post-test

Geometry

As Figure 3 shows, there was a significant change between pre-test and post-test scores (Time 3). Of all teachers with matching pre- and post-test data, 100% increased their scores.

Figure 3. Years 1-2 Geometry Teacher Gains in Content Knowledge



* pre-test and mid-point test

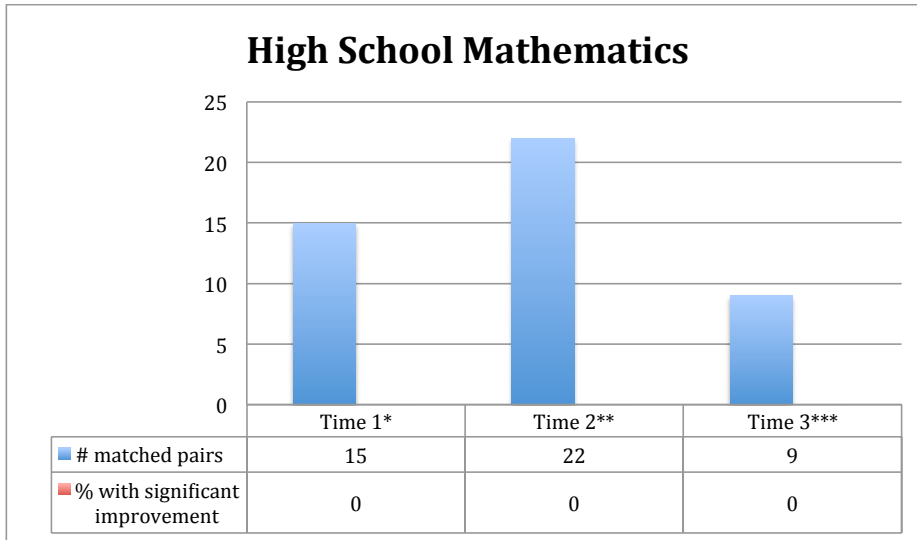
**mid-point test and post-test

***pre-test and post-test

High School Math

There were no significant gains during Time 1 or Time 2 in the high school math cohort (See Figure 4). However, in Time 3, there was a significant increase on the high school math exam. Of the teachers with both pre- and post-test data, 100% significantly increased their scores.

Figure 4. Years 1-2 HS Mathematics Teachers Gains in Content Knowledge



* pre-test and mid-point test

**mid-point test and post-test

***pre-test and post-test

Several math teachers increased their content knowledge during Time 3. 6 of 17 (35%) teachers showed significant increases on the assessment during this time.

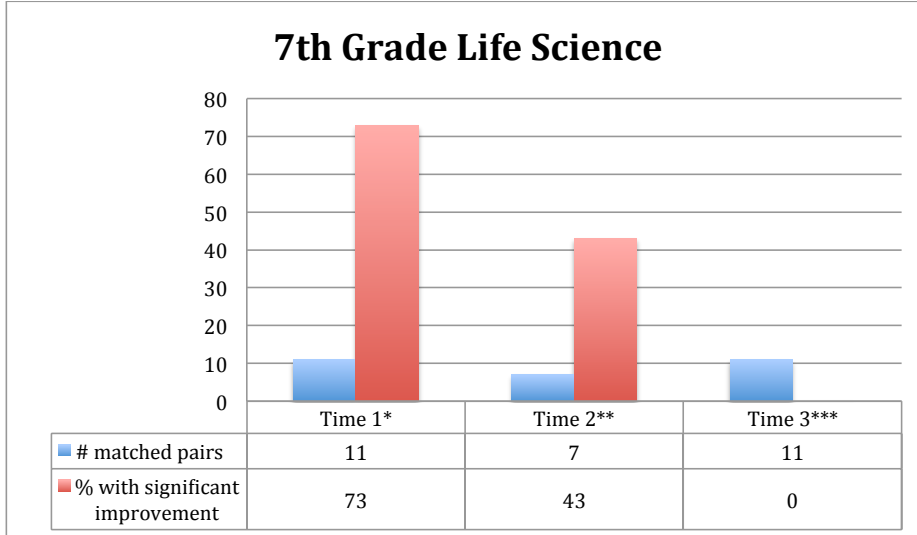
Science Teacher Content Knowledge

Participating science teachers were also given a pre-test in the Summer of 2009, a mid-point test in Spring of 2010, and a post-test in the Spring of 2011. These tests were based on their content area and grade level. For all figures below, Time 1 represents a comparison between pre-test and mid-point test data, Time 2 represents a comparison between mid-point and post-test data, and Time 3 represents a comparison between pre-test and post-test data.

7th Grade Life Science

As Figure 6 shows, there were no significant increases during Time 3 on the 7th Grade Life Science assessment.

Figure 5. Years 1-2 7th Grade Life Science Teachers Gains in Content Knowledge



* pre-test and mid-point test

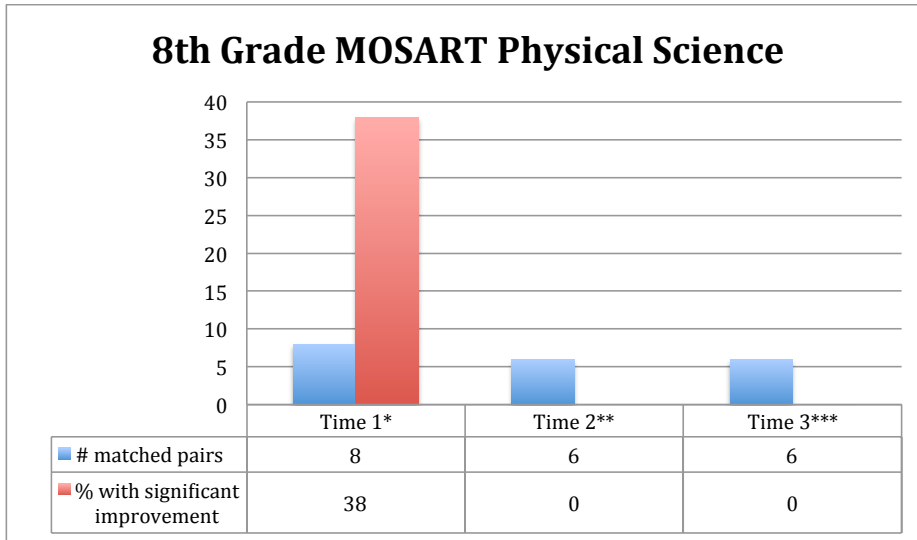
**mid-point test and post-test

***pre-test and post-test

8th Grade Physical Science

The only time period during which 8th Grade teachers exhibited significant increases in their content knowledge of Physical Science was Time 1 (See Figure 7). Of the teachers with both pre- and mid-point test data, 38% significantly increased their scores.

Figure 6. Years 1-2 8th Grade Physics Teachers Gains in Content Knowledge



* pre-test and mid-point test

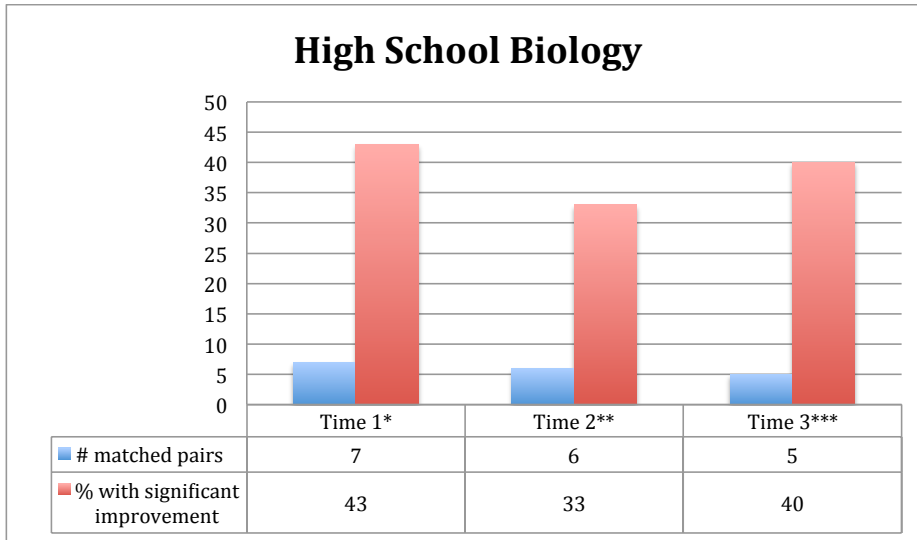
**mid-point test and post-test

***pre-test and post-test

High School Biology

40% of High School Biology teachers showed significant increases in content knowledge between the pre-test and post-test, or Time 3 (See Figure 7).

Figure 7. Years 1-2 HS Biology Teacher Gains in Content Knowledge



* pre-test and mid-point test

**mid-point test and post-test

***pre-test and post-test

HS Physical Science

Due to a small cohort size, no statistical analysis was performed on the data from the High School Physical Science test.

To summarize the general performance of all math and science cohorts, fewer science teachers increased their content knowledge than did math teachers during Time 3. Only 9% (2 out of 12) of science teachers improved their score on the assessments in Time 3.

Focus Groups

Two focus groups, one for math and one for science, were conducted in the spring of 2011. Two participants were randomly selected from each cohort to attend the focus groups. The protocol for these discussions is included in Appendix C. Overall, the focus

groups produced conflicting feedback on the overall MASTERS program. It was apparent that participants had very different experiences based on the cohort and the model of the professional development they were involved in. The science teachers seemed to have more positive experiences and opinions than the math teachers. Among the math teachers, high school math teachers generally had more negative feedback regarding the content and utility of the workshops than the middle school math teachers.

Science teachers

In general, feedback from the science teachers regarding their experiences in the MASTERS program was very positive. All participants felt that participating in the program helped them broaden their content and knowledge base. Two teachers specifically mentioned the benefit of collaborating with other teachers. For example, a High School Biology teacher said: *“We bounce a lot of ideas off of each other. I don't have a biology background; so I've been personally insecure teaching biology. So this has been great for me. I've gained greater depth from this experience.”*

Science teachers felt very supported by the MSP administrators. Of great value to several teachers was the feedback they received. A High School Physical Science teacher said, *“You get really attached to your facilitators. Everybody seems to be open with suggestions. Everyone is helpful”*, while a High School Biology teacher stated *“they were very supportive. They provided very valuable feedback, and it's always positive feedback. All teachers can appreciate that.”* However, similar sentiments were not expressed for school administrators. On the contrary, some teachers felt that their administration was either unaware of what they were doing or uninterested, while others felt their administration was supportive and helpful.

Math teachers

Generally, the high school math teachers had more negative experiences and feedback on the content of the workshops than the middle school teachers about the MASTERS program. None of the high school math teachers felt that their content knowledge increased as a result of the MSP. The consensus was that the content they discussed was disjointed, and needed to be grade-level specific. One teacher stated that she “*didn’t get much content-wise. I had to teach myself statistics; it was very disjointed. I requested grouping, and it was never discussed in detail how to condense content by grade level*”. This finding was substantiated with teacher test data, which showed that none of the high school mathematics teachers increased their test scores.

On the other hand, the middle school math teachers generally had positive experiences in the MSP. One teacher appreciated working with other teachers because it provided the opportunity to learn different approaches to the same material. Other middle school math teachers shared similar comments, expressing how they enjoyed exchanging ideas with other teachers. Although the middle school teachers initially did not see the value in the lesson study organization, this changed over time, as they began to appreciate its collaborative aspect.

Similar to the science teachers, math teachers differed in the extent to which they felt supported by school administrators. One teacher shared her lessons learned from the MSP workshops at monthly meetings and another received encouragement from her principal, while others received no recognition for their participation.

Findings: Classroom Impact

Student Achievement

CRCT and EOCT student achievement data were gathered from Rockdale County Public Schools (RCPS) and Newton County Schools (NCS). Teacher names were replaced with numbers to ensure anonymity. These data are organized by grade level and content area (math or science). As a comparison, the pass rate for each teacher's students was correlated to the district pass rate for the same subject area and grade level. Mathematics tests are presented first, followed by the science test scores. Table 4 shows the CRCT mathematics scores for the participating teachers. Each teacher's individual mathematics scores are compared to the mathematics scores for the entire district. They are also compared to the state averages as reported by the Georgia Department of Education.

In the mathematics cohorts, 3,301 students were impacted by teachers participating in the MASTERS professional development workshops in Year 2. The total number of math students impacted increased from 2,436 students in Year 1. Looking solely at student performance by participating teacher, students from six of the twenty-one (or 29%) Middle School Math teachers with reported CRCT data had higher pass rates than their respective school district and the state of Georgia (See Table 3).

Table 3. Middle School Mathematics 2011 CRCT Data

Teacher ID	District	Grade Level	Teacher % students who Met or Exceeded 2011	District % students who Met or Exceeded 2011	State of GA % students who Met or Exceeded 2011*
1	Newton	8	70%	75%	78%
2	Newton	8	75%	75%	78%
3	Newton	Quest	100%	n/a	
4	Newton	Special Education	46%	n/a	n/a
5	Newton	6	65%	70%	76%
6	Newton	8	43%	75%	78%
7	Rockdale	8	85%	80%	78%
8	Rockdale	8	86%	80%	78%
9	Rockdale	8	83%	80%	78%
10	Rockdale	Program Challenge	100%	n/a	n/a
11	Rockdale	8	91%	80%	78%
12	Rockdale	8	75%	80%	78%
13	Rockdale	8	25%	80%	78%
14	Rockdale	6 th -8 th	100%		
15	Rockdale	8	66%	80%	78%
16	Rockdale	8	71%	80%	78%
17	Rockdale	Special Education	60%	n/a	n/a
18	Rockdale	6	100%	83%	76%
19	Rockdale	7	100%	92%	89%
20	Rockdale	8	17%	80%	78%
21	Rockdale	Math Connections	88%	n/a	n/a

* Data are rounded to the nearest tenth.

Students from 13 of the 28 high school math classes outperformed students at the district level and state level, and 7 of the 28 classes outperformed students in the state of Georgia.

Table 4. High School Mathematics 2011 EOCT Data

Teacher ID	District	Grade Level	Teacher % students who Met or Exceeded 2011	District % students who Met or Exceeded 2011	State of GA % students who Met or Exceeded 2011
1	Newton	Math I	40%	48%	61%
2	Newton	Math I	28%	48%	58%
3	Newton	Math II	11%	36%	58%
4	Newton	Math I	29%	48%	61%
5	Newton	Math II	42%	36%	58%
6	Newton	Math I	46%	48%	58%
7	Rockdale	Math II	38%	51%	58%
8	Rockdale	Math II	33%	51%	58%
9	Rockdale	Math II	13%	51%	58%
10	Rockdale	Math II	36%	51%	58%
11	Rockdale	Math I	74%	57%	61%
12	Rockdale	Math II	8%	51%	58%
13	Rockdale	Math I	80%	57%	61%
14	Rockdale	Math II	100%	51%	58%
15	Rockdale	Math I and Math II ²	80%		
16	Rockdale	Math I	89%	57%	61%
17	Rockdale	Math I	100%	57%	61%
18	Rockdale	Math I	100	57%	61%
19	Rockdale	Math I	32%	57%	61%
20	Rockdale	Math I	58%	57%	61%
21	Rockdale	Math II	0%	51%	58%
22	Rockdale	Math I	52%	57%	61%
23	Rockdale	Math I	65%	57%	61%
24	Rockdale	Math I	84%	57%	61%
25	Rockdale	Math II	72%	51%	58%
26	Rockdale	Math I	42%	57%	61%

² Data for this teacher were not broken down by course.

27	Rockdale	Math II	63%	51%	58%
28	Rockdale	Math I	73%	57%	61%

The science MASTERS program participants impacted 4,676 middle school and high school students in Rockdale and Newton counties during Year 2. An examination of the middle school science cohorts in terms of student performance by teacher yields interesting results. Students from 22 of the 34 classes had higher pass rates than the district average on the seventh and eighth grade CRCT for science. This means that almost two-thirds (or 65%) of the participating teachers' students outperformed the district and the state in the area of science (see Table 5).

Looking solely at student performance by participating teacher, students from five of the nine (or 56%) High School Science teachers with reported EOCT data had higher pass rates than their respective school district and the state of Georgia (See Table 6).

Table 5. Middle School Science 2011 CRCT Data

Teacher ID	District	Grade Level	Teacher % students who Met or Exceeded 2011	District % students who Met or Exceeded 2011	State of GA % students who Met or Exceeded 2011*
1	Newton	7	72%	79%	82%
2	Newton	7	86%	79%	82%
3	Newton	7	88%	79%	82%
4	Newton	8	63%	66%	67%
5	Newton	8	71%	66%	67%
6	Newton	8	100%	66%	67%
7	Newton	7	94%	79%	82%
8	Newton	7	76%	79%	82%
9	Newton	7	80%	79%	82%
10	Newton	7	66%	79%	82%
11	Newton	8	71%	66%	67%
12	Rockdale	7	78%	86%	82%
13	Rockdale	7	87%	86%	82%
14	Rockdale	8	71%	63%	67%
15	Rockdale	8	78%	63%	67%
16	Rockdale	8	87%	63%	67%
17	Rockdale	7	71%	86%	82%
18	Rockdale	7	78%	86%	82%
19	Rockdale	8	74%	63%	67%
20	Rockdale	8	73%	63%	67%
21	Rockdale	8	83%	63%	67%
22	Rockdale	7	62%	86%	82%
23	Rockdale	7	54%	86%	82%
24	Rockdale	7	77%	86%	82%
25	Rockdale	7	76%	86%	82%
26	Rockdale	7	87%	86%	82%
27	Rockdale	8	100%	63%	67%
28	Rockdale	8	93%	63%	67%
29	Rockdale	8	93%	63%	67%
30	Rockdale	8	91%	63%	67%

Teacher ID	District	Grade Level	Teacher % students who Met or Exceeded 2011	District % students who Met or Exceeded 2011	State of GA % students who Met or Exceeded 2011*
31	Rockdale	8	85%	63%	67%
32	Rockdale	8	88%	63%	67%
33	Rockdale	8	62%	63%	67%
34	Rockdale	8	64%	63%	67%

Table 6. High School Science 2011 EOCT Data

Teacher ID	District	Grade Level	Teacher % students who Met or Exceeded 2011	District % students who Met or Exceeded 2011	State of GA % students who Met or Exceeded 2011*
1	Newton	Biology	85%	66%	70%
2	Newton	Biology	21%	66%	70%
3	Newton	PhySci	61%	70%	76%
4	Newton	PhySci	80%	70%	76%
5	Rockdale	Biology	92%	66%	70%
6	Rockdale	Biology	91%	66%	70%
7	Rockdale	Biology	85%	66%	70%
8	Rockdale	Biology	54%	66%	70%
9	Rockdale	PhySci	42%	70%	76%

Observations

RCPS math and science coaches and the higher-education faculty partners conducted classroom observations. Observations were conducted for several of the cohorts, including 7th Grade Life Science, High School Physical Science, High School

Biology, and High School Mathematics.³ When possible, two observations were conducted for each classroom during the Fall of 2010 and the Spring of 2011. Although the same observer did not conduct the observations during the Fall and Spring semesters, consensus among observers was achieved through the development and discussion of a common rubric (See Appendix B). In order to identify trends in teacher implementation, only teachers whose classrooms were visited twice are included in the analysis. Scores for each question were aggregated to calculate the average grade received, by time of observation. Table 7 provides an explanation of the questions used to assess the teachers.

Table 7 Teacher Observation Questions

Question	Description
SBI 2.2	Clearly communicates the learning expectations (Standards and Essential Question Posted).
SBI 1.1	Teacher serves as facilitator/coach to support the learners.
SBI 1.1	Lesson delivery model is engaging for students.
SBI 1.2	Engages students in higher-order thinking skills.
P1.4	Students are active participants in the learning process.
SBI 1.4	Uses flexible grouping based on assessment and instructional goals.
SBI 2.3	Provides effective feedback/commentary on student performances.

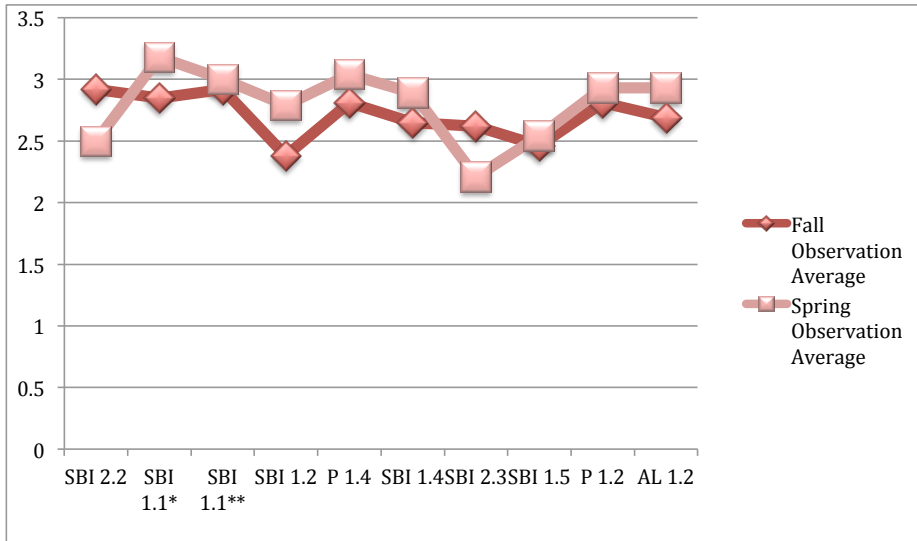
³ Observations were not conducted for the cohorts undergoing the Lesson Study plan.

SBI 1.5	Uses accessible technology to enhance learning.
P1.2	Maximizes instructional time.
AL 1.2	Uses formative assessment strategies to adjust instruction.

7th Grade Life Science Cohort

In 8 of the 10 areas of interest, 7th grade Life Science teachers received higher rankings, on average, in Spring 2011 than in Fall 2010. As Figure 8 shows, teachers were consistently ranked higher during the second observation. The only categories in which teachers did not receive higher scores were SBI 2.2 (*Clearly communicates the learning expectations [Standards and Essential Question Posted]*) and SBI 2.3 (*Provides effective feedback/commentary on student performances*). Appendix D provides additional information on the score averages.

Figure 8. 7th Grade Life Science Teacher Observations for Fall and Spring



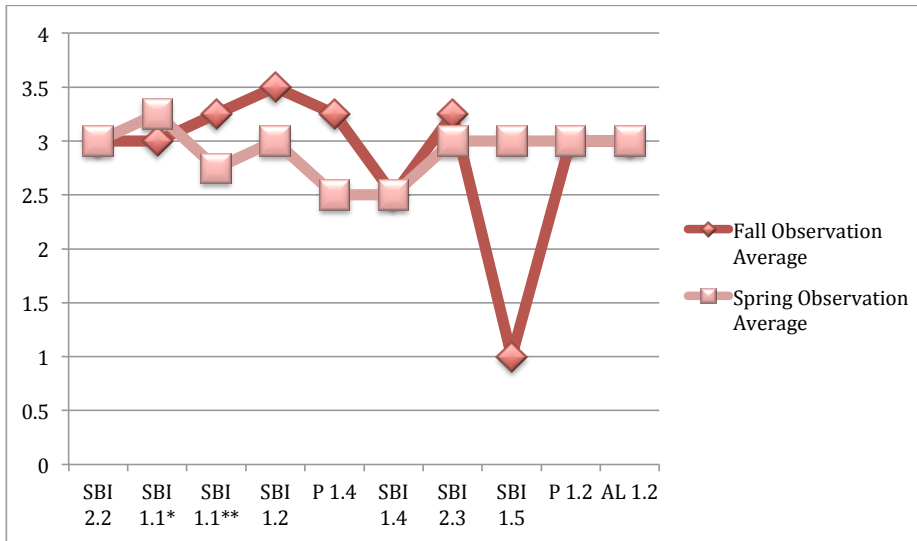
* Teacher serves as facilitator/coach to support the learners.

** Lesson delivery model is engaging for students.

High School Physical Science Cohort

High School Physical Science teachers were ranked higher in only 2 of the 10 categories in Spring 2011 compared to Fall 2010. Figure 9 shows that these categories were SBI 1.1 (Teacher serves as facilitator/coach to support the learners) and SBI 1.5 (Uses accessible technology to enhance learning). In 4 of the remaining 8 categories, teachers received lower rankings in the Spring of 2011. For the remaining 4 categories, teachers actually received the same rankings, on average (See Appendix E).

Figure 9. HS Physical Science Teacher Observations for Fall and Spring



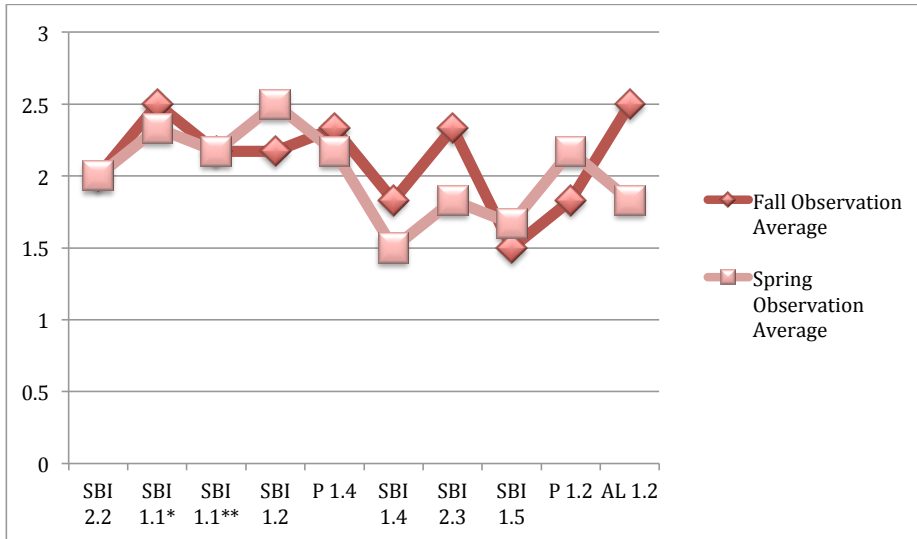
* Teacher serves as facilitator/coach to support the learners.

** Lesson delivery model is engaging for students.

High School Biology

In 3 of the 10 areas of interest, High School Biology teachers received higher rankings, on average, in Spring 2011 than they did in Fall 2010. Figure 10 demonstrates that teachers were consistently ranked higher during the first observation. The only categories in which teachers did not receive higher scores were *SBI 1.2* (Engages students in higher-order thinking skills), *SBI 1.5* (Uses accessible technology to enhance learning), and *P1.2* (Maximizes instruction time). Appendix F provides additional information on the score averages.

Figure 10. HS Biology Teacher Observations for Fall and Spring



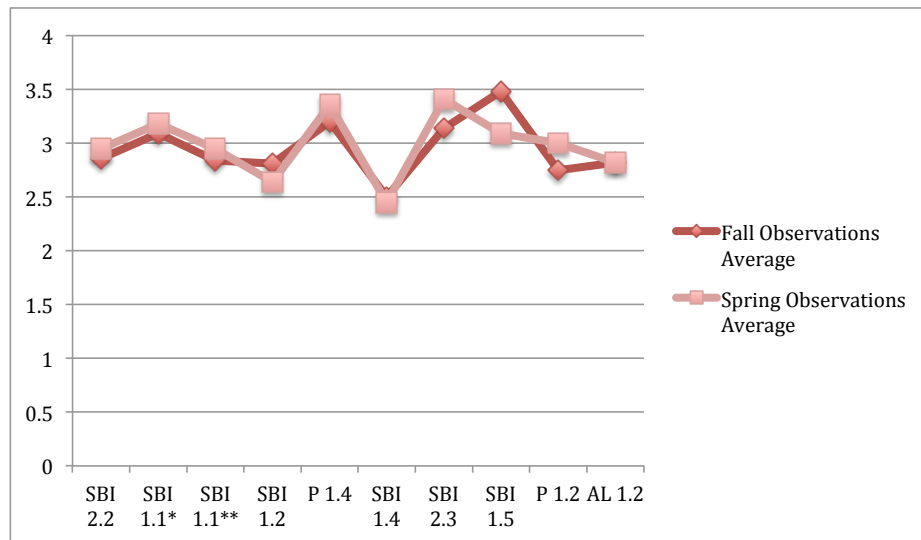
* Teacher serves as facilitator/coach to support the learners.

** Lesson delivery model is engaging for students.

High School Mathematics

High School Mathematics teachers were ranked higher in 6 of the 10 categories in Spring 2011 compared to Fall 2010 (see Figure 11). These categories were SBI 2.2 (Clearly communicates the learning expectations [Standards and Essential Question Posted]), *SBI 1.1* (Teacher serves as facilitator/coach to support the learners), *SBI 1.1* (Lesson delivery model is engaging for students), *PI.4* (Students are active participants in the learning process), *SBI 2.3* (Provides effective feedback/commentary on student performances), *PI.2*. (Maximizes instructional time). In 3 of the remaining 4 categories, teachers received lower rankings in Fall 2010. For the remaining category, teachers actually received the same rankings (See Appendix E).

Figure 11. HS Math I and II Teacher Observations for Fall and Spring



* Teacher serves as facilitator/coach to support the learners.
 ** Lesson delivery model is engaging for students.

Overall, the two cohorts that demonstrated the most progress between Fall and Spring semesters were the 7th Grade Life Science and High School Math. These cohorts increased their average scores on the observations in 8 of 10 areas of interest (7th Grade Life Science) and in 6 of 10 areas of interest (High School Mathematics). The remaining cohorts with teacher observation data did not demonstrate comparable progress.

Conclusion

The MASTERS MSP program successfully recruited and maintained a consistent cohort of teachers throughout Years 1 and 2. Through professional development

workshops, the teachers received training on science/mathematics content and pedagogy. Results from workshop evaluations show consistent positive ratings from participating teachers. In evaluating the entire two-year experience, many teachers expressed the value of collaborating with other teachers and how it positively impacted their content knowledge and knowledge of teaching activities/strategies.

Using test results as an indicator of content knowledge, several of the teachers significantly increased their mathematics and science content knowledge. Among the science and math teachers with matching pre- and post-test data, 21% significantly increased their content knowledge. Although results from self-reported data show that almost half of participating teachers strongly agree that they increased their content knowledge through the MASTERS program, this is not reflected in the test results.

Few clear patterns emerge from the data on teacher observations. As previously discussed, only data from teachers who had two observations were analyzed. There were only two cohorts that demonstrated, on average, higher ratings in Spring compared to Fall. Student achievement data were also considered in the evaluation. Data show that, depending on the cohort, some classes of MSP participants outperformed their respective districts and the state of Georgia.

This evaluation identifies several areas for improvement in the Rockdale/Newton County MASTERS program. First, include more field trips in the program that are easily applicable to the GPS (Georgia Performance Standards). Second, identify more overlap between the content for the joint middle and high school math workshop. Third, develop more in-class activities that can be easily translated to the classroom. Fourth, generate more high school math content that is reflective of different grade levels.

In conclusion, results from the evaluation of the 2009-2011 Rockdale/Newton County MASTERS program are mixed. While some indicators show positive impacts, other indicators show minimal improvement.

Appendix A Evaluation Instruments

Professional Development Feedback Forms



2011 Rockdale/Newton MSP

Date: _____
 School District: _____
 Grade Level: _____
 Instructor's Name: _____

Answer Selection: Correct = ● Incorrect = ✕ ✓ ⊖

TO WHAT EXTENT, IF ANY, WAS THIS WORKSHOP SUCCESSFUL IN EACH OF THE FOLLOWING WAYS?	Not at all	Small Extent	Moderate Extent	Great Extent
1. It was appropriate to my knowledge, skills, and interests.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. It increased my content knowledge.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. It stimulated me to think about ways I could improve my instructional practices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. It provided me with strategies to transfer what I learned into classroom practice.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. It increased my ability to teach the Georgia Performance Standards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. It increased my ability to see and explore ways to integrate math, science and technology.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. It provided methods to better identify and meet the needs of my students.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. It provided me with an opportunity to become	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

a member of a professional learning community.				
9. It provided knowledgeable facilitators and staff genuinely interested in helping me improve.	<input type="checkbox"/>	<input type="checkbox"/>	◀	▶
10. It provided me with learning activities that were effective and useful.	<input type="checkbox"/>	<input type="checkbox"/>	◀	▶

WHAT PART OF THIS WORKSHOP HAS BEEN MOST VALUABLE TO YOU?
WHAT PART OF THIS WORKSHOP HAS BEEN LEAST VALUABLE TO YOU?
ADDITIONAL COMMENTS OR SUGGESTIONS:

Appendix B Teacher Observations Form

**Rockdale – Newton MSP for Teachers
Classroom Visits**

School:
of students present:

Date:

Teacher:
Visitor(s):

Classroom Analysis of State Standards									
1= Not Evident, 2= Emerging, 3=Proficient, 4= Exemplary									
<p>SBI 2.2. Clearly communicates the learning expectations (Standards and Essential Question Posted).</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4	<p>SBI 1.4. Uses flexible grouping based on assessment and instructional goals.</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4						
1	2	3	4						
<p>SBI 1.1. Teacher serves as facilitator/coach to support the learners.</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4	<p>SBI 2.3. Provides effective feedback/commentary on student performances.</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4						
1	2	3	4						
<p>SBI 1.1. Lesson delivery model is engaging for students.</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4	<p>SBI 1.5 Uses accessible technology to enhance learning.</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4						
1	2	3	4						

<p>SBI 1.2. Engages students in higher-order thinking skills.</p> <table border="1" data-bbox="220 268 703 300"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4	<p>P1.2. Maximizes instructional time.</p> <table border="1" data-bbox="756 275 1221 306"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4						
1	2	3	4						
<p>P1.4. Students are active participants in the learning process.</p> <table border="1" data-bbox="220 464 703 495"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4	<p>AL 1.2. Uses formative assessment strategies to adjust instruction</p> <table border="1" data-bbox="756 464 1221 495"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	1	2	3	4
1	2	3	4						
1	2	3	4						

<p>Lesson Summary (From warm-up to closure, to include the GPS addressed and essential question during the lesson)</p>	
<p>Additional Notes/Comments</p>	

Appendix C Focus Group Questions

1. Please describe your overall opinion of the MSP program.
Probes: How useful is the information you learned through the workshops?
How would you describe your interactions with instructors?
How would you describe your interactions with the other teachers?
2. What are the most important ideas you gained from this professional development experience?
Probes: What new skills, if any, do you have? How will these new skills improve your abilities to help students learn? What instructional techniques did you learn? How has MSP shaped the way you learn content?
3. How supported did you feel by the program administrators?
Probes: If you had any of the following issues, how were they addressed? i.e. payment, receiving credit for professional development activities, communication?
4. How supported did you feel by the administration in your school?
Probes: Did you have any opportunities to share your newly acquired knowledge with teachers/administrators at your school? Did you receive recognition for your efforts? Were you able to get a substitute teacher easily?
5. What information, if any, did you share with your colleagues (non-MSP participants)?
-Probe with: pedagogical changes? Content knowledge? Instructional techniques? Activities?
6. What changes have you seen in your students' learning since beginning the MSP program?
Probe with: comprehension, knowledge, increased attendance, fewer disciplinary issues
7. What else would you like to add?

Appendix D 7th Grade Life Science Teacher Observations

7th Grade Life Science		
	Fall Observation Average	Spring Observation Average
SBI 2.2 Clearly communicates the learning expectations (Standards and Essential Question Posted).	2.92	2.5
SBI 1.1 Teacher serves as facilitator/coach to support the learners.	2.85	3.18
SBI 1.1. Lesson delivery model is engaging for students.	2.92	3.00
SBI 1.2. Engages students in higher-order thinking skills.	2.38	2.79
P1.4. Students are active participants in the learning process.	2.81	3.04
SBI 1.4. Uses flexible grouping based on assessment and instructional goals.	2.65	2.89
SBI 2.3. Provides effective feedback/commentary on student performances.	2.62	2.21
SBI 1.5 Uses accessible technology to enhance learning.	2.46	2.54
P1.2. Maximizes instructional time.	2.81	2.93
AL 1.2. Uses formative	2.69	2.93

assessment strategies to
adjust instruction

Appendix E High School Physical Science Teacher Observations

HS Physical Science		
	Fall Observation Average	Spring Observation Average
SBI 2.2 Clearly communicates the learning expectations (Standards and Essential Question Posted).	3.00	3.00
SBI 1.1 Teacher serves as facilitator/coach to support the learners.	3.00	3.25
SBI 1.1. Lesson delivery model is engaging for students.	3.25	2.75
SBI 1.2. Engages students in higher-order thinking skills.	3.5	3.00
P1.4. Students are active participants in the learning process.	3.25	2.50
SBI 1.4. Uses flexible grouping based on assessment and instructional goals.	2.5	2.50
SBI 2.3. Provides effective feedback/commentary on student performances.	3.25	3.00
SBI 1.5 Uses accessible technology to enhance learning.	1.00	3.00
P1.2. Maximizes instructional time.	3.00	3.00

AL 1.2. Uses formative assessment strategies to adjust instruction	3.00	3.00
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Appendix F High School Biology Teacher Observations

HS Biology		
	Fall Observation Average	Spring Observation Average
SBI 2.2 Clearly communicates the learning expectations (Standards and Essential Question Posted).	2.00	2.00
SBI 1.1 Teacher serves as facilitator/coach to support the learners.	2.50	2.33
SBI 1.1. Lesson delivery model is engaging for students.	2.17	2.17
SBI 1.2. Engages students in higher-order thinking skills.	2.17	2.50
P1.4. Students are active participants in the learning process.	2.33	2.17
SBI 1.4. Uses flexible grouping based on assessment and instructional goals.	1.83	1.50
SBI 2.3. Provides effective feedback/commentary on student performances.	2.33	1.83
SBI 1.5 Uses accessible technology to enhance learning.	1.50	1.67
P1.2. Maximizes	1.83	2.17

instructional time.		
AL 1.2. Uses formative assessment strategies to adjust instruction	2.50	1.83

Appendix G High School Math I and II Teacher Observations

HS Math I and II		
	Fall Observation Average	Spring Observation Average
SBI 2.2 Clearly communicates the learning expectations (Standards and Essential Question Posted).	2.86	2.95
SBI 1.1 Teacher serves as facilitator/coach to support the learners.	3.09	3.18
SBI 1.1. Lesson delivery model is engaging for students.	2.84	2.95
SBI 1.2. Engages students in higher-order thinking skills.	2.81	2.64
P1.4. Students are active participants in the learning process.	3.20	3.36
SBI 1.4. Uses flexible grouping based on assessment and instructional goals.	2.50	2.45
SBI 2.3. Provides effective feedback/commentary on student performances.	3.14	3.41
SBI 1.5 Uses accessible technology to enhance learning.	3.48	3.09
P1.2. Maximizes	2.75	3.00

instructional time.		
AL 1.2. Uses formative assessment strategies to adjust instruction	2.82	2.82