School-Based Teacher Leaders:
Longitudinal Analysis

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This evaluation report, prepared by the Delaware Education Research and Development Center (R&D Center), includes a description of the performance of a group of mathematics teachers who participated in the School Based Teacher Leaders (SBTL) project from 2005 until 2009 in the state of Delaware. During five years trained observers from our center conducted classroom observations as part of the annual evaluation of the project.

The first year we only observed teachers during the spring. During four weeks in May of 2005 a group of eight observers went into 41 math classes across the state. The lessons ranged from 40 to 180 minutes in grades sixth to eighth. The following four school years, we observed teachers twice a year. In October of 2005 and May of 2006, as part of the second year of the SBTL Project evaluation, 47 math lessons were observed in October and seven months later 37 out of the 47 teachers were visited again. The lessons observed occurred in sixth to tenth grade classrooms. They ranged from 40 to 120 minutes in length. The following year, in October of 2006 and May of 2007, we gathered data from the same 33 teachers during the October and May observation periods. In addition, three more teachers were observed in May. They occurred in sixth to tenth grade classrooms. The lessons observed ranged from 25 to 100 minutes in length. Then, in October of 2007 and May of 2008, as part of the fourth year evaluation, we gathered data from 38 teachers in October and 34 teachers in May, and 30 teachers were observed both times. The lessons observed occurred in sixth to eleventh grade classrooms, and ranged from 30 to 107 minutes in length. Finally, in October of 2008 and May of 2009, as part of the last year of the SBTL Project evaluation, observers were sent into math classrooms to gather data about math instruction across the state. We gathered data from 35 teachers in October and

35 teachers in May, and 30 teachers were observed both times. The lessons observed occurred in sixth to tenth grade classrooms, and ranged from 30 to 100 minutes in length. As in the previous years, observers looked for specific evidence regarding the three main components: lesson design and implementation, math content, and classroom culture.

	Teachers	Grades	Lesson length	Number of students
Spring 2005	41	6 to 8	40 to 180 min	9 to 32
Fall 2005	47	6 to 10	20 to 90 min	7 to 30
Spring 2006	37	6 to 10	40 to 120 min	7 to 32
Fall 2006	33	6 to 10	40 to 100 min	14 to 35
Spring 2007	36	6 to 10	25 to 92 min	9 to 32
Fall 2007	38	6 to 11	30 to 99 min	11 to 32
Spring 2008	34	6 to 10	35 to 107 min	7 to 29
Fall 2008	35	6 to 10	30 to 100 min	6 to 34
Spring 2009	35	6 to 10	40 to 96 min	8 to 35

To assess teachers' instruction during these years, we used an observation protocol developed by University educators from the Mathematics & Science Education Resource Center in conjunction with researchers from the R&D Center. The observation protocol called "Determining the Quality of Mathematics Instruction" was adopted as the main measure of teaching quality. The instrument includes a range of behavior descriptors for several items for the three main components. The observed behaviors were classified as one of three possible categories. The three categories were: (1) "close to ideal," (2) "getting there," and (3) "not even close." Items or questions for each component were as follows:

The design and implementation of the lesson:

1. Teacher clearly defines and communicates a purpose of the lesson.

2. Teacher effectively engages students with important ideas.

3. Teacher provides adequate time and structure for investigation and exploration.

4. Teacher provides adequate time and structure for "wrap-up."

5. Teacher achieves a collaborative approach to learning.

6. Teacher enhances the development of student understanding.

7. Teacher assesses the students' level of understanding.

8. Teacher plans and/or adjusts instruction based on students' level of understanding.

Mathematics content:

1. The content is balanced between conceptual understanding and procedural fluency.

2. The content is challenging and accessible to the students.

3. Teacher provides content information that is accurate.

4. Elements of mathematical abstraction are included when appropriate to do so.

5. Appropriate connections are made to other mathematics and/or to real world content.

Classroom culture:

1. Active participation of ALL is expected and valued.

2. There is a climate of respect for students' ideas, questions, and contributions.

3. Teacher's classroom management style/strategies enhance productivity.

4. The classroom climate is encouraging to students

5. Intellectual rigor and/or the constructive challenge of ideas are evident.

The Design and Implementation of the lesson

This component includes eight questions. The questions refer to the main structure of the lesson as well as to very important aspects of students' understanding.

In Question 1 at the end of the five years we observed an almost perfect performance of teachers in the project. At the beginning of the project, about four out of ten teachers clearly communicated the purpose of the lesson to their students, four years later, almost all of them did this effectively.

Five years back, teachers' performance in Question 2 indicated a third of them engaged students with important ideas, a third was "getting there", and a third was "not even close." By spring of 2009 almost two thirds of them were classified as "close to ideal." The category of "not even close" was reduced from 33% to 12.5%.

1. Teacher clearly defines and communicates a purpose
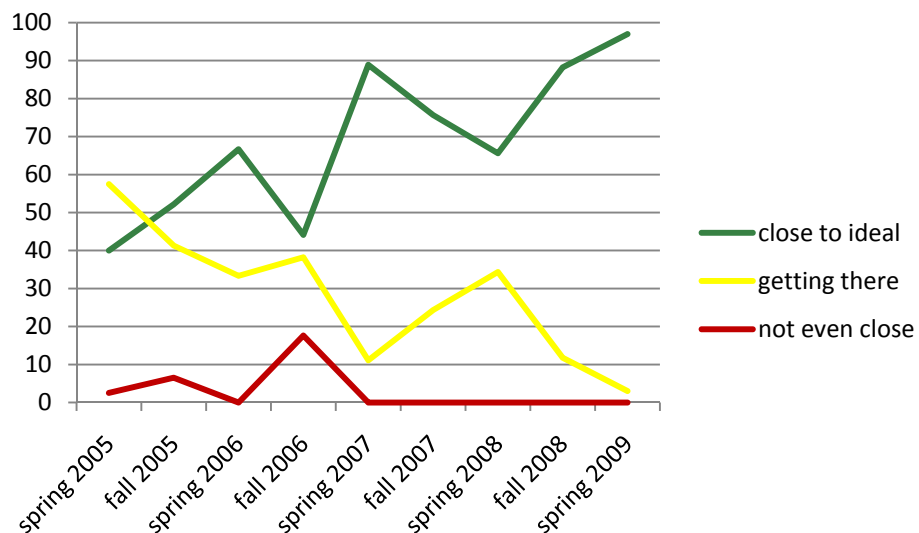
2.   Teacher effectively engages students with important ideas
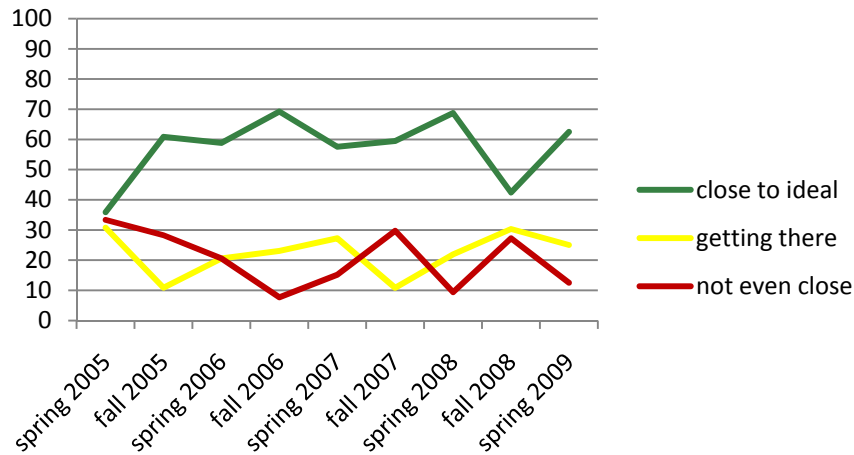
Regarding Question 3, whether teachers provided adequate time and structure for investigation and exploration, in spring of 2005 60% of the teachers were classified as "not even close." Only 25% of teachers were classified as "close to ideal." In fall of 2006 the highest category reached its peak at 73% but by the spring of 2009, this number declined. At the end, we classified around 50% of teachers as "close to ideal"." At that same time period, almost 40% of teachers were classified as "not even close." The intermediate classification remained at a very low percentage across time.

In Question 4 while the "close to ideal" category remained around 30 %, we saw a decrease in the frequency of the "not even close" and an increase in the "getting there" category.

3. The teacher provides adequate time and structure for investigation and exploration.
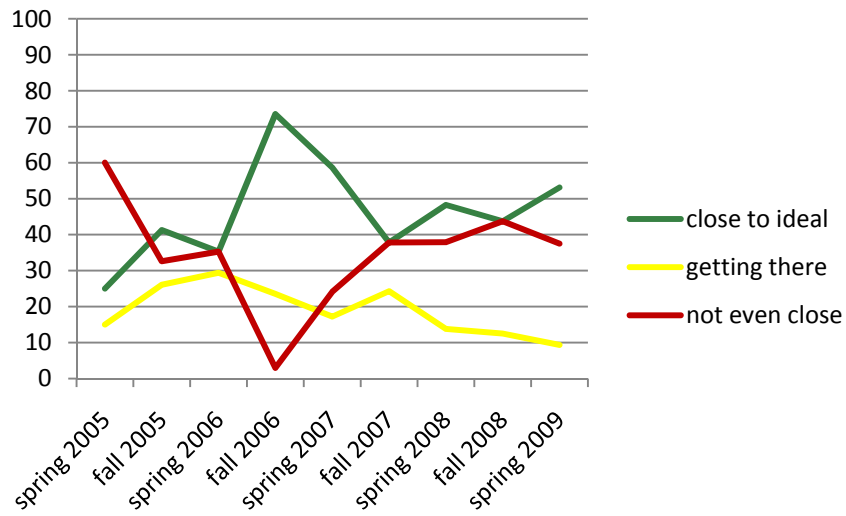

4. Teacher provides adequate time and structure for "wrap-up."
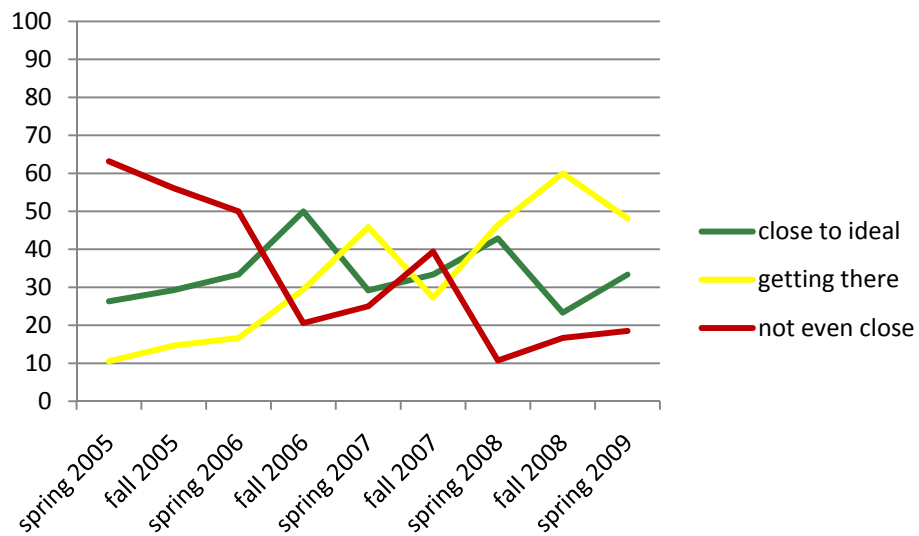
We observed few changes in the performance of teachers regarding the accomplishment of collaborative approach to learning, Question 5. While at the beginning of the project approximately 30% of teachers were classified as "close to ideal" and 30% as "getting there," four years later still 33% were close to ideal' and 43% were "getting there." We saw a decrease of teachers classified as "not even close" in these five years from 42% to 23%.

5.   The teacher achieves a collaborative approach to learning.
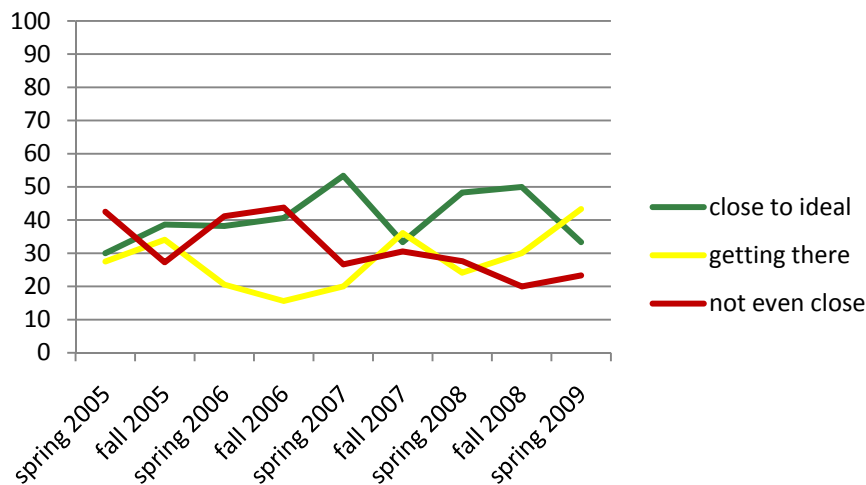
Similar to the performance of Question 5, in Question 6, we observe few changes across time. Regarding teachers enhancing the development of students' understanding, in spring 2005 more than 50% of the teachers obtained the lowest rating. Four years later this number decreased 20 percentage points. This proved to be a difficult task for teachers. This question had the lowest percentage of teachers who showed a "close to ideal" performance. Only 25% of the teachers were classified as such in the spring of 2009.

6.   The teacher enhances the development of student understanding
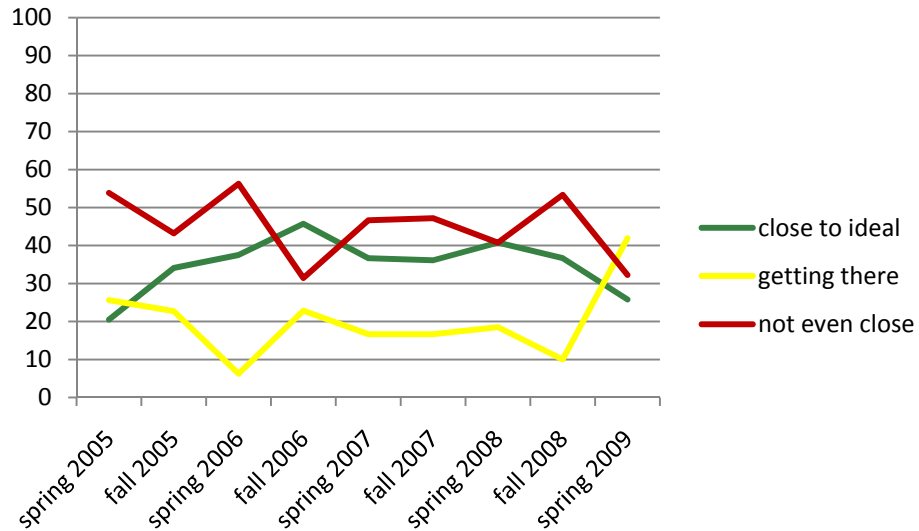
When assessing students' understanding, Question 7, teachers showed a better performance than developing students' understanding. However this skill remained pretty stable across years. The "close to ideal" category started with 50% of the teachers and at the end of the five-year period ended with 58% of them.

7.   The teacher assesses the students' level of understanding.
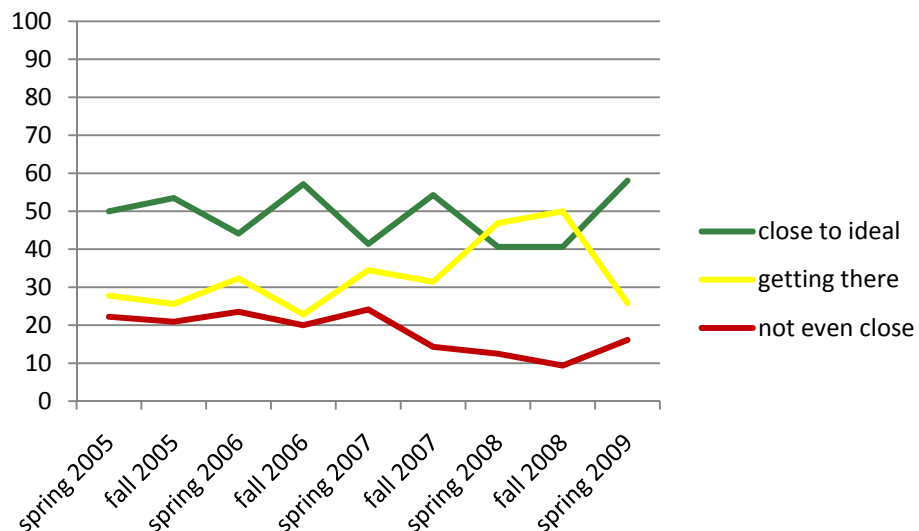
The last question of this component is Question 8. In this question we saw what could be considered a desired teachers' performance across time. Regarding teachers planning or adjusting their instruction based on students' level of understanding, we observed a decrease to almost zero in the "not even close" and "getting there" categories and an increase on the "close to ideal" category to almost all teachers doing it by spring of 2009.

It appears that some teachers were having trouble enhancing students' level of understanding, but fewer teachers were having trouble assessing it. However, almost all teachers managed to adjust their lessons based on what students understood.

8. Teacher plans and/or adjusts instruction based on students' level of understanding.
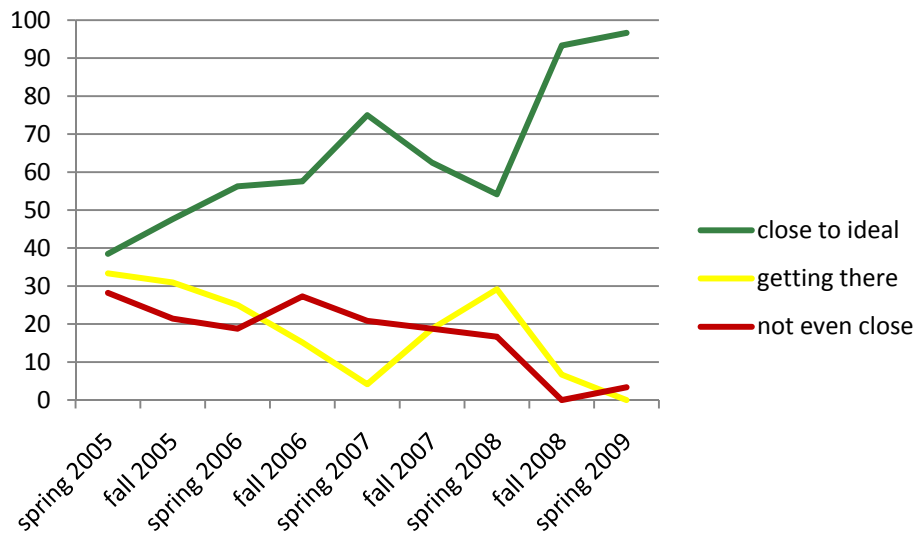

Mathematics Content

This component includes five questions. The questions refer to the mathematical content of the lesson with a special interest in abstraction, mathematical connections.

We saw an improvement in the proportion of teachers who presented a balanced mathematical content between conceptual understanding and procedural fluency, Question 1. In spring of 2005, a third of teachers were classified as "close to ideal." In spring of 2009, more than 70% were classified in this category. The biggest improvement was observed in the last year of the project. In spring of 2008, 55% of the teachers were classified as "not even close," while less that 30% of them were classified as "close to ideal." A year later the positions not only switched, but also the difference between categories widened.

1. The content is balanced between conceptual understanding and procedural fluency.
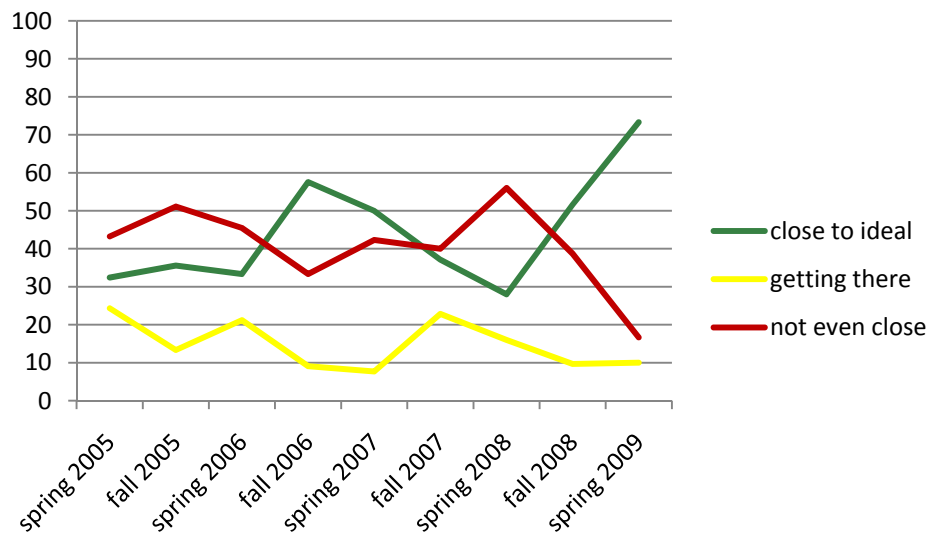
Once again, in question 2, we observed what could be considered a desired teachers' performance across time. We saw a pattern where the category "close to ideal" increased considerably and the percentage of teachers in the other two categories was reduced. This time was about the mathematical content being challenging and accessible to all students. On the one hand, we observed a decrease to ten and 20% in the "not even close" and

"getting there" categories, respectively. On the other hand, we observed an increase on the "close to ideal" category to 70% of teachers doing it by spring of 2009.

2. The content is challenging and accessible to the students.
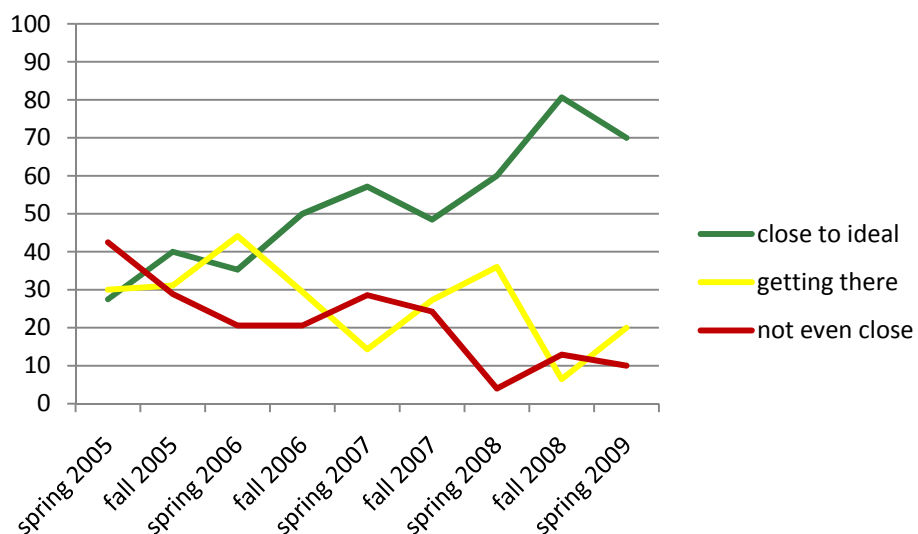

Question 3 presents an interesting pattern. Where the percentage of teachers "not even close" to provide accurate mathematical content in their classes was practically zero in each time period, in spring of 2005 60% of teachers were classified as "getting close." In spring of 2009, this number dramatically decreased to less than ten percent. Consequently, the percentage of teachers performing "close to ideal" increased from 36% to just below 90% in spring of 2009.

Question 4, alternatively, presented a challenge to teachers. Mathematical abstraction was not easy to achieve. Although teachers improved from the first to the fifth year of the project, by the spring of 2009, almost the same percentage of teachers were classified as "close to ideal" and as "not even close" (38% and 34%, respectively).

3.   Teacher provides content information that is accurate.
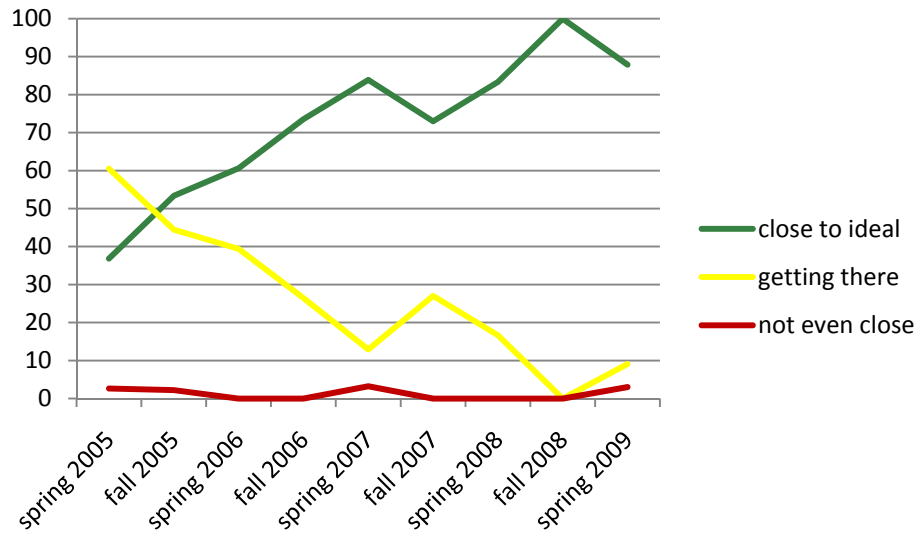
4.   Elements of mathematical abstraction are included when appropriate to do so.
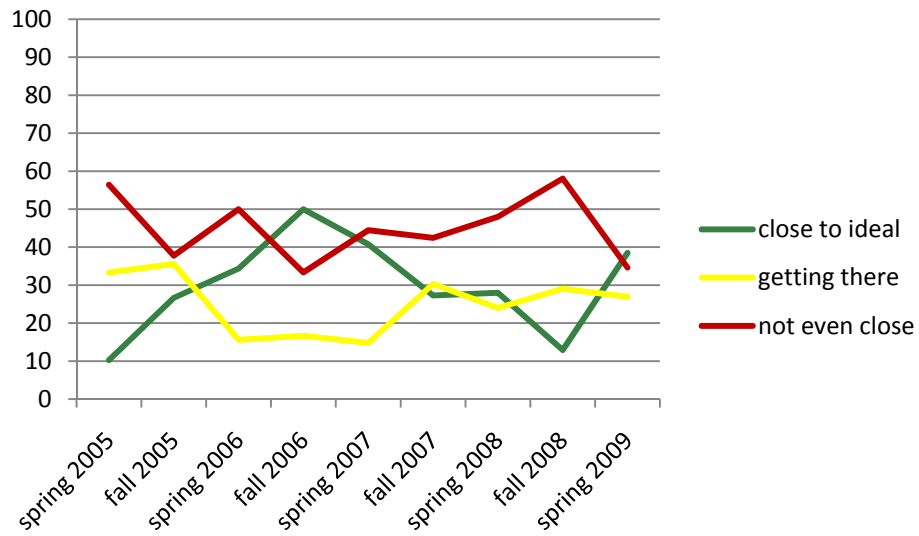
The last question of this section is about teachers making appropriate connections to other mathematical concepts or to real world content. For Question 5, the trajectory of the "close to ideal" category remained stable until fall of 2008. At this time the percentage of teachers making appropriate connections increased more than 40 percent points. Similarly the percentage of teachers doing a poor job with connections dropped almost 40 percentage points in the same period.

5.   Appropriate connections are made to other mathematics and/or to real world content.
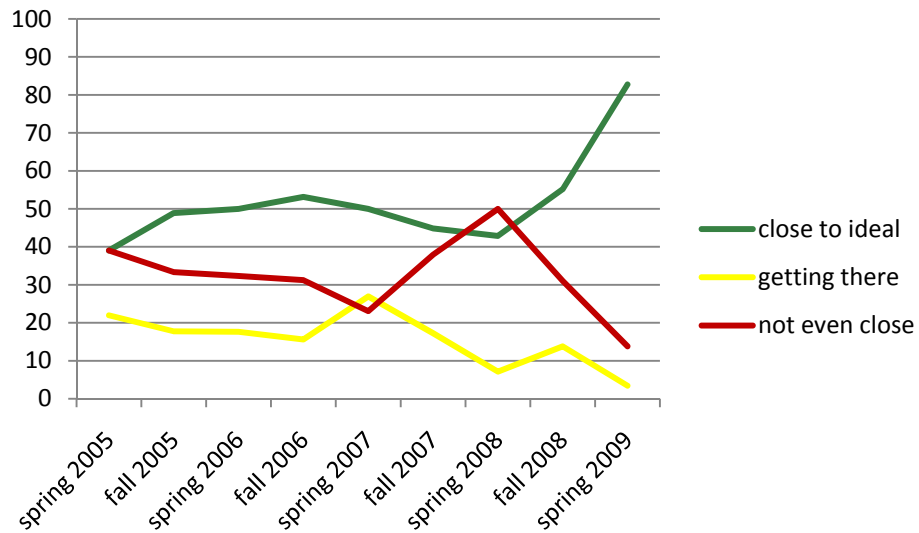

Classroom Culture

This component includes five questions. The questions refer to the teachers' management strategies and to the classroom environment. As part of the environment, this section includes a question about intellectual rigor and the constructive challenge of ideas in the classroom.

We observed a positive change in the matter of students' active participation, Question 1. In spring of 2005, the percentage of teachers classified as "close to ideal" was the lowest of all and the category "not even close" started at almost 50%. By the end of the five-year project the category "close to ideal" was at more than 60% and "not even close" decreased to almost zero percent.

1. Active participation of ALL is expected and valued.
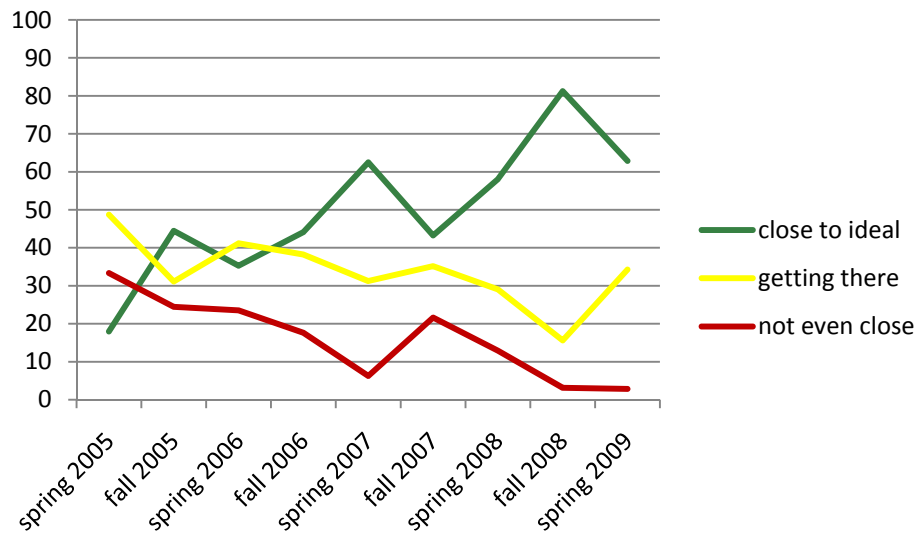
In Question 2 we saw a pattern where the category "close to ideal" increased considerably and the percentage of teachers in the other two categories was reduced. On the one hand, we observed a decrease to around five percent in the "not even close" and "getting there" categories. On the other hand, we observed an increase on the "close to ideal" category to close to 90% of classrooms with a climate of respect for students' ideas, questions, and contributions by spring of 2009.

2. There is a climate of respect for students' ideas, questions, and contributions.
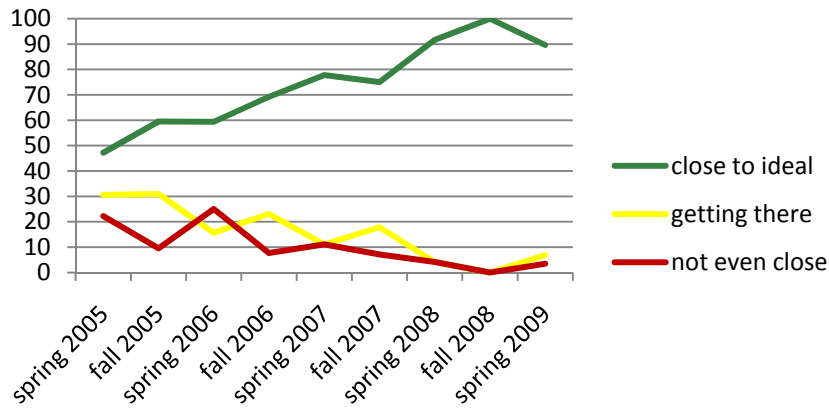

Similar to Question 2, in Question 3 we saw a positive pattern where the category "close to ideal" increased considerably and the percentage of teachers in the other two categories was reduced. First, we observed an increase on the "close to ideal" category to close to 90% of teachers whose classroom management style and strategies enhanced productivity. Second, we observed a decrease to around 5% in the "not even close" and "getting there" categories by spring of 2009.

3. The teacher's classroom management style/strategies enhance productivity.
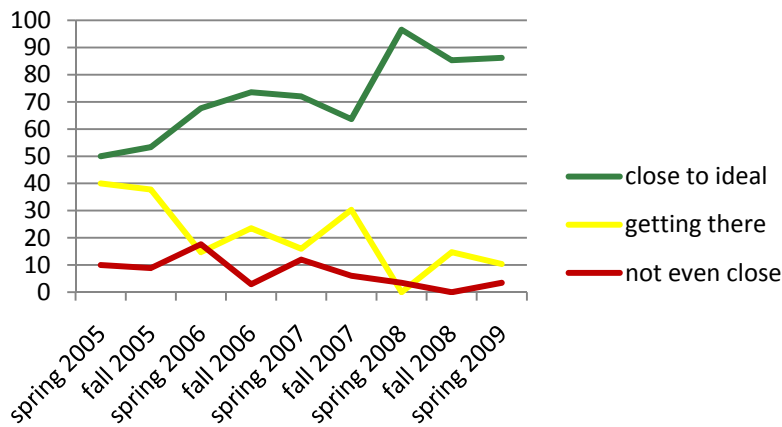
4. The classroom climate encourages students
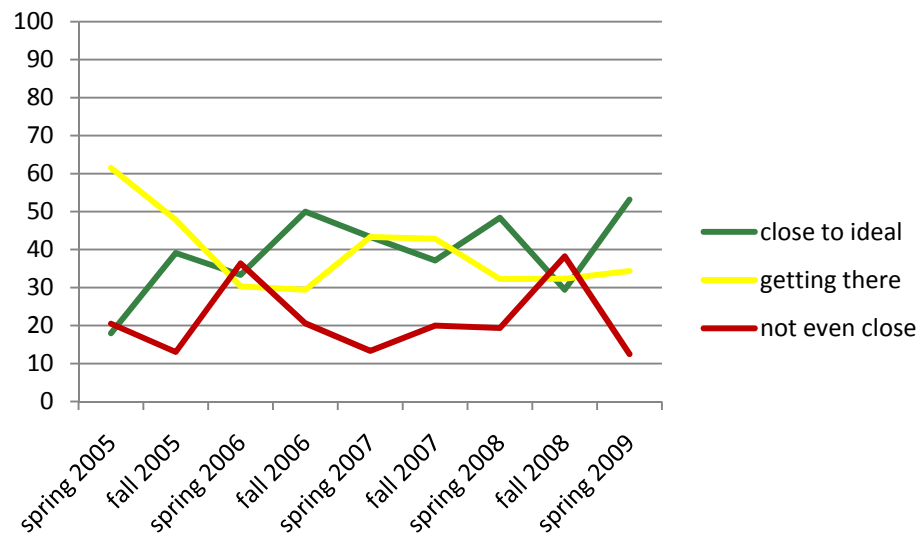
In Question 4, we observed slight changes across time. Regarding the classroom climate encouraging students, in spring 2005 about 20% of the teachers obtained the highest and lowest ratings. Four years later this number decreased to 12% and the "close to ideal" category increased to 53%. This proved to be a difficult task for teachers; almost half of them could not achieve a "close to ideal" encouraging climate for the students by the spring of 2009.

Question 5 had similar proportions of teachers in the three categories most of the time. This question also presented a challenge to teachers. Intellectual rigor was not easy to achieve, the constructive challenge of ideas was not always evident. Teachers remained with very similar percentages from the first to the fifth year of the project, by the spring of 2009, almost 50% of teachers were classified as "not even close," and teachers in the other two categories had much lower percentages (22% and 29%, respectively).

5. Intellectual rigor and/or the constructive challenge of ideas are evident.
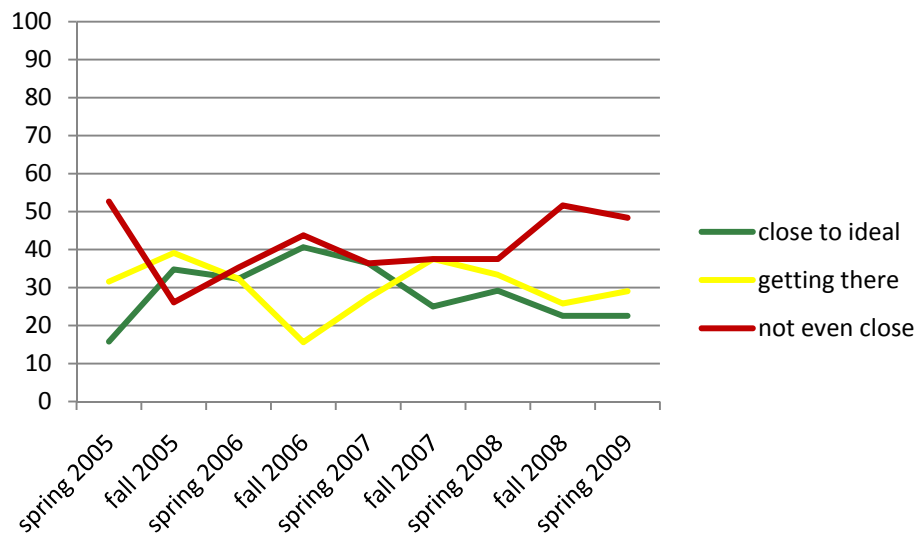
Conclusion

We observed change in teachers' performance from spring of 2005 to spring of 2009 in most cases. We saw improvement in the following areas:

❄ Teacher clearly defines and communicates a purpose of the lesson.

❄ Teacher effectively engages students with important ideas.

❄ Teacher plans and/or adjusts instruction based on students' level of understanding.

❄ The content is balanced between conceptual understanding and procedural fluency.

❄ The content is challenging and accessible to the students.

❄ Teacher provides content information that is accurate.

❄ Appropriate connections are made to other mathematics and/or to real world content.

❄ Active participation of ALL is expected and valued.

❄ There is a climate of respect for students' ideas, questions, and contributions.

❄ Teacher's classroom management style/strategies enhance productivity.

We consider that the following areas remained constant during the five-year period:

- ❊ Teacher provides adequate time and structure for investigation and exploration.

- ❊ Teacher provides adequate time and structure for "wrap-up."

- ❊ Teacher achieves a collaborative approach to learning.

- ❊ Teacher enhances the development of student understanding.

- ❊ Teacher assesses the students' level of understanding.

- ❊ Elements of mathematical abstraction are included when appropriate to do so.

- ❊ The classroom climate is encouraging to students

- ❊ Intellectual rigor and/or the constructive challenge of ideas are evident.