Using Guided Math to Differentiate in Middle School

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Context

This is my eighth year teaching at John C. Coonley Elementary School. Coonley is a PreK-8th grade neighborhood school with regional gifted and special education program. I currently teach both neighborhood and gifted students in our departmentalized middle school. Coonley offers its students a wide range of enrichments opportunities, including Music, Drama, Art, Library, Spanish, and Physical Education. We also have a technology instructor who collaborates with teachers in their classrooms and helps to facilitate the use of our computer lab, laptop carts, iPad carts, and Chromebook carts. Additionally, our middle school is 1:1 with Chromebooks. Coonley has changed dramatically since I began teaching here in 2007. The North Center and Lincoln Square neighborhoods have become a popular choice for Chicago families with young children. Enrollment at my school was under 300 students when I started teaching at Coonley and has ballooned to over 900 students this year as more and more families in our neighborhood choose public education. A remodel of the school in 2008 not just updated our main building, but also created a park-like campus with a large playground, an artificial turf field, and an outdoor classroom that has become the center of our neighborhood.

As a result of our growth, our main building has been overcrowded for the past few years. To alleviate this overcrowding, our community successfully pushed for more space and an addition that includes 12 classrooms and a large multipurpose room and cafeteria was completed in September 2014. The annex houses our middle school students and the main building houses our primary and intermediate students. The

addition has also provided classrooms for many of our enrichment teachers that used to push into classrooms, including Drama, Music, and Spanish.

As Coonley as grown so have our test scores. 87% of our student performed in the meets or exceeds on the 2012-2013 ISAT up from 74% on the 2008-2009 ISAT. Last year Coonley's growth was recognized by the Chicago Sun Times which ranked it as 21st school statewide up from 102nd in 2012 and 388th in 2011. Our student population is primarily White (55%) and Hispanic (29%). 11% of our student population is Multi Racial, 4% is Asian, and 1% is Black. Our percentage of low income students has decreased each year as the neighborhood becomes more affluent and was 29% last year down from 52% in 2009. 10% of our students are English Language Learners and 12% receive Special Education services.

Coonley is committed to providing before and after school opportunities for our students. We offer a range of free and pay programs, ranging from chess to seasonal dramatic productions to homework and academic programs. Coonley parents are very involved in all aspects of the school. We have a very active PTO and LSC, as well as the Friends of Coonley which coordinates significant fundraising efforts which has helped to fund both enrichment programs and instructional supports.

In my eight years at Coonley, I have had the opportunity to teach a mixture Language Arts, Science, and Math classes to our middle school students. I have also worked to complete my math and science endorsements and received certification to teach the Algebra Initiative Program to 8th graders. I have primarily taught math in recent years and take tremendous pride the growth my students and school have seen over the past eight years.

Literature Review

Like many other teachers, I have struggled with differentiation in my math classroom. My struggles included large class sizes with wide-ranging abilities, grappling with a huge amount of assessment data, not having technology or a computer-assisted learning tool, and student behavior issues. I have tried a variety of strategies and approaches to address these struggles and found that a guided reading type model that combined small and whole group instruction worked best. Still, I struggled to check-in with individual students, meet with groups in the most meaningful ways, and ensure that I was holding all students accountable for their learning. The guided math model outlined by Sammons (2013) addressed most of the components of my struggle to differentiate.

What is Differentiation?

A differentiated instructional approach is "based on the premise that teachers must consider who they are teaching as well as what they are teaching (Little, 2009, pp. 6). Differentiation is a challenging task for all teachers. The middle school math classroom presents many unique differentiation challenges for teachers and students. Mathematics instructional practices should include differentiated instruction, metacognitive strategies and instructional routines, progress monitoring and formative assessments, and computer-assisted instruction or Universal Design for Learning (UDL)(Little, 2009).

Differentiation often involves flexible grouping, designing instruction to appeal to different learning styles, and using a gradual release of responsibility to foster student learning. The ultimate goal of all differentiation is student mastery of curriculum. Metacognition elicits students to use higher order thinking in the problem-solving process and includes strategies like mnemonics, graphic organizers, and KWL charts. Assessment and progress monitoring while often thought of as "testing" is the process by which teachers develop tasks that match student needs, instructional strategies, and curriculum. Together they give teachers valuable information about their instruction and student learning and performance. Computer-assisted instruction or UDL addresses a wide range of instructional needs and adapts to the immediate needs of individual students (Little, 2009).

What is Guided Math?

Guided math is an approach to differentiating math instruction. It includes seven instructional components, they include: creating a classroom environment of numeracy, developing math warm ups and calendar board activities, whole-class instruction, guided math or small group instruction, independent math workshop, individual conferences, and ongoing assessment. Students experience each of these components over the course of the week (Sammons, 2013).

Monday is a whole-class instruction day. The teacher introduces the topics and strategies that will be covered during the week and explains that independent work that students will complete for the week. Tuesday begins with a mini lesson which is a math-related read-aloud and discussion of the connections to the week's topics and strategies. Afterwards the teacher circulates for fifteen minutes and conferences with students as they begin independent math workshop tasks. The last 30 minutes of class are spent with students in guided math small group one. Wednesday opens with problem solving mini lesson, after which students continue math workshop while the teacher meets with guided math small group two. There is no mini lesson on Thursday, instead the teacher meets with both guided math small group three and group one again. Friday is another whole-class instruction day; students meet in Math Huddle where they share and discuss their observations and strategies for the week.

Leveraging Differentiation and Guided Math to Meet the Needs of My Students

While the guided math model provides an exceptional framework for differentiating in the math classroom, I found it challenging to implement in my middle school classroom without making some modifications. The model calls for three groups; however, given my class sizes of 30 plus students I felt as though I needed more groups so that each group does not have ten or more students. I

also have curriculum and assessment requirements that did not easily fit into the framework. Furthermore, my school has recently started using Think Through Math (TTM) which is a computer-based program that provides individualized math instruction through an online platform.

Teaching in a gifted classroom presents unique challenges for differentiation. Mathematically gifted students are typically able to complete work and problem solve above grade level, still gifted students math abilities can vary just as much as those of students in non-gifted classroom. Reed offers suggestions for differentiating instruction in the gifted classroom. They include extending activities, investigating open-ended questions, and allowing students to self-select problems from a defined problem set (2004).

Like non-gifted students, gifted students have a wide array of interests and multiple intelligences. Instruction that addresses many of these interests and intelligences is likely to be better received by students and generally more effective. In her research, Kondor uses student survey data to guide instructional strategies and grouping in the math classroom (2007). Administering similar surveys to my students provided a multitude of information that I did not already know about my students.

My 6th and 7th grade gifted math classes contain heterogeneous groups nearly all of whom have above level math skills. Differentiation for these groups has been challenging in previous years because students are quick to recognize

when they are not in the "highest" group and can be very hard on themselves as such. Mixed grouping has been an equally difficult challenge because students who are performing at the highest levels tend to dominate lessons and groups, while those who are at grade level continue to get frustrated. The competitiveness of these groups and their parents is frustrating for me because they often want to be doing the "highest" or "best" work, even when it is not appropriate for their abilities.

Taking all of this into consideration, I developed a guide math based model that I felt would better suit the needs of my unique class. First, I choose to create more groups consisting of five students. This meant that I would need to meet with six groups as opposed to the typical three groups that are more typical to guided math. Next, I decided to replace one of the mini-lessons related to the current content rather than mini-lessons during the week. Each week I created a simple schedule specific to each group, that provided a snapshot of what they needed to complete and when they would be working with me. Lastly, my Friday whole group lesson involved reviewing the concept for the week and having each group share out an assigned problem or task they completed during the week

Data Collection Methods

I collected the following data over the course of my project: results of a general interest survey about student, learning habits, and styles; pre-study survey and post-study survey results; chapter pre-test and post-test results; notes from conferences with individual students; and, notes from teacher observation. The following data is available at this point in the project. In addition to the data preliminary analysis of the available data has been included.

General Interest Survey

The General Interest Survey was administered at the beginning of the study. It asked students to agree or disagree with a series of statements, such as I have trouble copying from a book or the Smart Board and I prefer teachers to explain directions out loud instead of having to read the written directions.

Pre/Post Study Survey

Students were also asked to complete a Pre-Study Survey before I began my research and a Post-Study Survey which they completed again at the end of the study. Rather than being objective like the General Interest Survey, these surveys asked students to respond to open-ended questions, such as what are your favorite activities in school and what would make reading class better for you?

Chapter Pre-Tests and Chapter Post-Tests

Student data on formative instructional assessment was also tracked during this project. Students were asked to complete chapter pre assessments at the beginning of each chapter and chapter post assessments at the end of each chapter. This data was used to assess student mastery of the math content, as well as to form the cooperative groups students worked in as part of the guided math structure.

Conference Notes & Teacher Observation Notes

Individual student conferences with the entire class in mid -April to discuss their progress in reading and math, as well as their recent scores on the winter administration of the NWEA MAP assessments. Notes were taken during these conferences and the teacher held follow up conferences with individual students as needed. Teacher observations will be made during the entirety of this project. Observations were tracked through journaling throughout the research process.

Data Analysis & Conslusions

General Interest Survey - Beginning of Study:

Statement	# of Agrees	# of Disagrees
1) I have poor handwriting.	12	18
2) I have trouble copying from a book or the Smart Board.	1	29
3) I easily forget what I read unless it is talked about in reading group.	5	25
4) I prefer teachers to explain directions out loud instead of having to read the written directions.	19	11
5) I prefer listening to music to watching TV.	12	18
6) I prefer talking on the phone to writing a letter to someone.	26	4
7) I would rather be in a group discussion than read about a topic.	21	9
8) I like to take part in plays or theater; I like to act things out.	14	16
9) I would rather read about a topic than listen to a teacher tell about it.	21	9
10) I like to read ahead in class when material is being read aloud.	23	7
11) I like classrooms that have lots of pictures and posters to see.	24	6
12) I can learn to spell words by simply reading them several times.	18	12
13) I prefer watching TV to listening to music.	18	12
14) I have trouble remembering directions that were told to me.	10	20
15) I would rather go to a movie than to a concert.	20	10
16) I would rather watch a sport than play it.	15	15
17) I would rather participate in a sport than watch one.	15	15
18) I don't understand Math well unless I work through a lot of problems.	10	20
19) I like to make models or create things with my	17	13

hands.		
20) I would rather do experiments in Science than read about them.	29	1
21) I get bored in class when I just have to sit and listen to the teacher.	24	6
22) I have trouble remembering directions that are told to me if I have not done a similar activity before.	11	19
23) I like being outdoors and doing activities like hiking, biking, swimming, horseback riding, camping, etc.	24	6
24) I don't like going to a museum where I can't touch anything.	9	21

General Interest Survey - End of Study:

Statement	# of Agrees	# of Disagrees
1) I have poor handwriting.	9	20
2) I have trouble copying from a book or the Smart Board.	0	29
3) I easily forget what I read unless it is talked about in reading group.	4	25
4) I prefer teachers to explain directions out loud instead of having to read the written directions.	10	19
5) I prefer listening to music to watching TV.	23	6
6) I prefer talking on the phone to writing a letter to someone.	27	2
7) I would rather be in a group discussion than read about a topic.	27	2
8) I like to take part in plays or theater; I like to act things out.	19	10
9) I would rather read about a topic than listen to a teacher tell about it.	11	18
10) I like to read ahead in class when material is being read aloud.	27	2
11) I like classrooms that have lots of pictures and	26	3

posters to see.		
12)I can learn to spell words by simply reading them several times.	23	6
13)I prefer watching TV to listening to music.	7	22
14)I have trouble remembering directions that were told to me.	16	13
15)I would rather go to a movie than to a concert.	18	11
16)I would rather watch a sport than play it.	15	14
17)I would rather participate in a sport than watch one.	15	14
18)I don't understand Math well unless I work through a lot of problems.	20	9
19)I like to make models or create things with my hands.	17	12
20)I would rather do experiments in Science than read about them.	29	0
21)I get bored in class when I just have to sit and listen to the teacher.	24	5
22)I have trouble remembering directions that are told to me if I have not done a similar activity before.	16	13
23)I like being outdoors and doing activities like hiking, biking, swimming, horseback riding, camping, etc.	27	2
24)I don't like going to a museum where I can't touch anything.	3	26

Several trends were noted after data from this survey was analyzed. Overall this group of students seems to prefer to talk about things rather than write about them. They also seem to prefer to be active than passive when it comes to their learning—that is, they prefer to be part of their learning and not to just be lectured too. An equal number of students would be prefer to watch versus play a sport, but a large majority of student enjoy outdoor activities. Also,

more students prefer to watch TV than listen to music. Lastly, it seems like students in this class feel that they can master tasks, instructions, and spelling quickly and that they prefer visuals in the classrooms. I do not feel like I learned anything incredibly new about my class as a whole from this survey, but I did learn some interesting things about individual students. End of survey results show very similar opinions; in many cases more students had moved in the direction of a majority of their class mates. Music and collaboration seem to be very important to students by the end of the year. I feel that this survey, like other pieces of data, helped me confirm that I have a good understanding of what motivates and interests this group of students.

Chapter Pre-Tests and Chapter Post-Tests

Student #	Unit 1 Pre-Test	Unit 1 Post-Test	Unit 2 Pre-Test	Unit 2 Post-Test	Unit 3 Pre-Test	Unit 3 Post-Test
1	20%	96%	15%	88%	25%	94%
2	50%	100%	60%	98%	55%	100%
3	20%	98%	20%	100%	25%	96%
4	35%	98%	40%	100%	50%	100%
5	50%	100%	40%	98%	50%	98%
6	15%	94%	20%	92%	30%	96%
7	30%	98%	25%	100%	30%	98%
8	25%	94%	30%	96%	30%	100%
9	65%	100%	60%	100%	60%	100%
10	10%	96%	20%	100%	25%	94%
11	20%	92%	30%	94%	30%	100%
12	10%	94%	20%	100%	25%	98%
13	25%	94%	20%	92%	35%	96%
14	20%	96%	10%	98%	30%	92%
15	20%	100%	30%		30%	

16	40%	96%	50%	100%	50%	100%
17	20%	96%	Transferred	Transferred	Transferred	Transferred
18	35%	98%	30%	96%	50%	100%
19	10%	96%	20%	92%	40%	88%
20	20%	98%	25%	94%	40%	94%
21	35%	98%	25%	100%	40%	92%
22	30%	96%	35%	98%	30%	100%
23	30%	96%	25%	98%	30%	94%
24	10%	92%	25%	98%	30%	96%
25	20%	98%	15%	88%	25%	96%
26	15%	90%	25%	98%	30%	92%
27	10%	100%	20%	96%	30%	100%
28	15%	98%	25%	92%	30%	94%
29	40%	100%	35%	98%	35%	100%
30	45%	100%	60%	100%	65%	100%
Average	26.3%	96.7%	29.4%	93.2%	36.4%	93.4%

Results on pre and post tests were similar over the course of my study. Pretest scores average between 26% and 36%, while posttest scores were even more similar between 93% and 96%. Pretest scores in the 20th and 30th percentiles, tell me that the instruction material was new and challenging for students. Post test scores in the 90th percentile tell me that my students were able to demonstrate mastery of the material by the end of the unit.

Case Studies & Analysis

Student	**Conference Notes**
Louis - 13	• 10/16/14 - Met to discuss spring 2014 MAP scores and his goals for the year. Louis describes himself as a strong reader, but adds that he is "terrible at math." His MAP scores reflect significantly higher reading that

	MAP scores, but above district average math scores. I shared this with him and he expressed frustration that math doesn't come as to him naturally as some of his classmates. • 11/5/14 – Grouped Louis with three students who have growth potential in the same areas (number sense and algebra) and one student who is strong in his growth potential area that is a close friend of Louis. • 11/14/14 – Checked in with Louis after the first investigation to see how the unit was going with his group. He said it was "fine as far as math goes." When I pressed him to describe it as better, worse, or the same as before we started guided math, he said he guessed it was better because he had people he was could ask for help and that working with other kids made math go faster. • 12/4/14 – Met with Louis after I graded the first unit test; I showed him that he went from 25% correct on his pretest to 94% on his post test. He seemed pleased with his results, but mentioned that he was dreading the MAP test he knew that the class would have to take after break. • 1/23/2015 – Had a quick conversation with Louis to see how he felt about the math MAP test later that morning. He said he felt like reading went well and he knew his score went up and that he was hoping for the same with math. • 2/11/2015 – Met with Louis to discuss his MAP test results which showed an 11 point drop from the spring. He knew he didn't do well and expressed that he didn't really feel like testing on that day. Louis said that he tried to take his time like we had talked about, but that when he was testing that he just wanted to "get it over with." • 4/14/2015 – Louis and I talked about an extracurricular prep course that he was starting to help prepare for the MAP test. It didn't sound as though he was looking forward to it, but that he was resigned to do everything he could to get the best possible score for high school applications. • 5/28/2015 – Met with Louis to discuss how he was

	feeling about the MAP test he would take the following Tuesday. He seemed more confident that he had I in previous conversations and said his prep class was "torture" but that it had "probably helped him." • 6/2/2015 – Louis took the math MAP test. I needed to prompt him three times to take his time, as he was moving through the test much more quickly that his peers. He scored a 239 which showed a three point increase from the previous year, but did not achieve his six point growth target. He was initially disappointed, but what happier when I explained that he went up from the previous year. • 6/4/2015 – Louis took the reading MAP test and scored a 243 which showed a ten point increase from the previous year and exceed his growth target of three. He was thrilled and said "it's good to know that I did well at what I like(reading) and okay at what I don't (math)."

Each of my case studies demonstrates the unique talents and personalities of a gifted learner. Louis is a great example of a student who highly talented linguistically and high-achieving in math. His case study shows the struggle that gifted students who do not score as high in math or reading as their peers do often face. Students can be highly competitive whether they mean to be or not and this can have a tremendous impact on other students, especially those who internalize these differences. Louis was and continues to be very aware that his math abilities while well-above average are not as high as many of his classmates. He is seems to be somewhat bothered by this, especially in that extra effort, awareness, hard work, and an extra prep class over the course of

the year did not yield the percentile results he was hoping for. As a teacher, it can be very challenging to guide a student like Louis through this. He does not want to hear that he is well above average and that many students would be quite pleased with his test scores. He wants to hear how he can achieve at the same levels that his highest peers are achieving at. I will continue to help Louis work through this next year and continue to provide supports to help him raise his math scores. At the same time, I plan to remind him and stress as much as possible tremendous reading abilities which he should be proud of. I also want to work with my entire class to educate them about multiple intelligences and how to promote the growth mindset which I think will help them as they enter the phase of their lives where they are most likely to compare themselves to each other in these ways.

Michael - 17	• 10/16/14 - Met to discuss spring 2014 MAP scores and his goals for the year. Michael describes himself as someone who doesn't really like school. He has been diagnosed with ADHD and sometimes takes medication. His MAP scores are high in both reading and math; he met his reading growth target and missed his math target by one point. Michael's grades are often B's and C's because he frequently misses assignment and projects. • 11/5/14 – Grouped Michael with three students who have growth potential in the same area (algebra) and two students who are strong in his growth potential area. Michael gets along really well with everyone in the class, but the group does not have any of his closest friends in an effort to minimize distractions. • 11/17/14 – Checked in with Michael after the first

	investigation to see how the unit was going with his group. He said it was "good." When I pressed him to describe it as better, worse, or the same as before we started guided math, he said it was "way better" because his group helped him stay focused on what needed to get done in class and for homework. • 12/4/14 – Met with Michael after I graded the first unit test; I showed him that he went from 20% correct on his pretest to 96% on his post test. He seemed content with his results and also shared that he would be transferring to a suburban school after winter break. • 12/5/14 – Spoke with Michael's dad who confirmed that the family would be moving and that Michael would not be returning from break. • 2/25/14 – Received an email from Michael's dad letting me know that he was doing well at his new school, but that he missed his friends and teachers at Coonley.

Michael, although I was not able to see him through the end of the year, demonstrates that gifted learners, like non-gifted learners, are impacted by ADD and ADHD. The struggle for gifted students and their families is the same as it is for other students. Michael and his family have a very down to earth way of handling his diagnosis and set reasonable expectations for his academic performance when compared to his performance on standardized tests. Even still, Michael struggled to keep up with his daily work and suffered anxiety as a result. I had looked forward to working this through with Michael over the course of my study. In the limited data I was able to collect, it seemed that by surrounding him with a close knit group of students who were on-task, that

Michael was better able to keep up with classwork and homework. More importantly, he was able to recognize this and communicate it to me. Creating groups is a very challenging task for teachers because the limitless inputs and outputs. Thoughtful grouping seemed to create success for Michael over the course of the first unit and I would have had to ensure that this continued in order to determine if it would perpetuate success for him.

Sarah - 29	• 10/16/14 - Met to discuss spring 2014 MAP scores and her goals for the year. Sarah described herself as someone who loves school and works really hard to always do her best. She expressed a strong desire to have all A's this year and score in the 99th percentile on both the reading and math MAP tests because she "really wants to go to Payton College Prep". Sarah has strong reading and math MAP scores in the 96th and 93rd percentiles respectively. • 11/5/14 – Grouped Sarah with three students who have growth potential in number sense and algebra. She was the strongest student in the group and excels in number sense. I included her in the group so that she could demonstrate her strong number sense in discussions with students who were not as strong in the area. Sarah gets along well with the entire class and is very helpful towards struggling students without coming across as condescending or a "know-it-all". Louis is also in her group. • 12/4/14 – Met with Sarah after I graded the first unit test; I showed her that she went from 40% correct on her pretest to 100% on her posttest. She was very pleased with her results and said she liked her group a lot. • 2/11/2015 – Met with Sarah to discuss her MAP test results which showed a 1 point gain from the previous spring. She was happy to have gone up, but knew

	that she would have to do better to get the 99th percentile she was hoping for. Sarah mentioned that she had asked her parents to sign her up for an extra MAP prep class that some of the class was taking to help her. • 5/28/2015 – Met with Sarah to discuss how she was feeling about the MAP test she would take the following Tuesday. She said she was "nervous" but that she felt "ready to get it over with". • 6/2/2015 – Sarah took the math MAP test. She scored a 269 which showed a seventeen point increase from the previous year, and demonstrated achievement of her six point growth target. Sarah was ecstatic to have met her personal goal of scoring in the 99th percentile. She said more than anything she thinks taking her time, and "talking through the problems in my head" helped her do so well. • 6/4/2015 – Sarah took the reading MAP test and scored a 251 which showed a fourteen point increase from the previous year and exceed her growth target of three. As with math, Sarah was beyond excited with her score and said "this has been my best year ever".

Sarah is the gifted learner who is all-around high-achieving and loves everything about school and learning. She recognizes her talents, but does not flaunt them to her teachers and peers. I would go so far as to say that many of her peers would be surprised to know that she has some of the highest scores in their class because she keeps her talents to herself. Teachers often forget to recognize the Sarahs in their class because they are always on-task and doing well. She did not need to be coached to set a goal for the year because she had already set one. She also very realistic about her strengths and weaknesses

and knows how to leverage her strengths to addresses her weaknesses. Sarah was happy to have had the extra conversations with me this year and told me this in our last conversation. She knows, as do I, that she does not need nor demand a lot of teacher attention on a daily basis. Still, it is something she deserves as a student and I think getting this attention for a change helped in part to push her to meet her goal and have a great year.

James – 16	• James was not one of my original case study students. I decided to add him after I learned that Michael was transferring and because of some comments he made after his winter MAP test. • 2/11/15 – James and I met to discuss his winter MAP scores. James describes himself as someone who "hates" school because "you have to do things that you don't want to do". James regularly expresses interest in completing independent study type projects instead of working in collaborative groups where he is forced to "people." While he has friends in the class and enjoys recess and gym with his peers, he dislikes interacting with other students in academic settings. When asked why this was the case, he said "I don't like making other people fell stupid." James was quite pleased with his scores. He said more than any other time he took the MAP test, he really tried his best because he wants to go to a good high school. He had a 274 which was up from a 262 in the previous spring; both scores fall in the 99th percentile. • 5/28/15 – Met with James to see what he had to say about the upcoming MAP test. He said he was confident that he would do well because his scores were already well into the 99th percentile for both reading and math. • 6/2/15 – James took the math MAP test and had to finish in a second session because it took him over two

	hours to complete the test. It was clear that he was trying his absolute best. He scored a 285 which is the highest score teachers at our school had seen on the test. James was highly pleased and had to be reminded not to "gloat" about his score his friends and the class, but that it was certainly an achievement to be proud of.

James, on the other hand, is the gifted learner who is all-around high-achieving and hates everything about school and learning. He recognizes his talents and feels as though he has to flaunt them to his peers. James often says that he hates to work with people and I think this may be in part because he realizes on some level that they expect a lot of him and he does not want to disappoint them. Students similar to James in a gifted classroom will always require a little extra care and consideration. If a student like James is turned off by a teacher, it can take considerable effort to regain his trust and respect. While I know that many gifted learners flaunt their talents to others because they are insecure about the limits of their talent, I had never considered this to be the case with James until I really reflected on his case study. James knows that he is and always has been one of the brightest students in his very bright class. As high school approaches and his peers cultivate their talents and come into their own, James seems more aware that there may be limits to abilities. His tendencies to not want to collaborate in academic settings may appear to be

antisocial on the surface, but may also indicate that he is afraid to show his classmates that he cannot do something as well as they can. I plan to really work with James next year to help him work though his desire to work alone to really get to the root of why he does not want to work with others sometimes.

End of Year 2013-2014 MAP Scores/End of Year 2014-2015

Performance Level	*# of Students BOY*	*# of Students EOY*
Exceeding Growth Target	12	17
Meeting Growth Target	0	2
Not Meeting Growth Target	19	10

Spring 2014 NWEA/MAP scores which were used as beginning of year (BOY) scores for the 2014-2015 school year, showed only 39% of the class met or exceeded their growth targets for the previous school year. While students were achieving high scores on the test, they were not showing expected growth. Spring 2015 NWEA/MAP scores which were used as end of year (EOY) scores for the 2014-2015 school year, showed that 66% of the class met or exceeded their growth targets for the school year. 27% more student were meeting and in more cases exceeding their growth targets at the end of the next school year. Six of the ten students who did not meet their growth targets, still showed growth over the course of the year. Four students showed no growth or a regression in their scores.

When reflecting on what led to the increase in the number of students meeting and exceeding on the MAP test, I feel that it was the opportunities that were created in the small groups that led to more meaningful math conversations that led to the increase. Students consistently demonstrated short-term mastery from the pre to post test scores for each unit. More long-term mastery, like what students would be expected to demonstrate on a standardized test like the MAP test was not as present. The opportunity to work in well-planned and thoughtful groups gave students a better opportunity to have deep and meaningful math related conversation. Additionally, students were individually expected multiple times each week to talk though math problems for each other and explain their thinking—far more frequently than they probably ever had been expected to. I feel that by really talking through problems they had more opportunities to internalize the material which in turn led to more long-term mastery as demonstrated by the increase in MAP scores.

It is also important for me to keep in mind that there are still 34% of students not meeting their growth targets. Growth targets are set by MAP with individual students and their needs in mind—they are not a reflection of any personal knowledge of students. There are countless debates surrounding standardized testing at the local, state, federal, and global level. These arguments aside, students on the most basic level want to achieve goals, arbitrary or not, that have been set for them—this is arguably even truer for

gifted and talented students. The guided math approach that I put in to practice this year has demonstrated success. I am optimistic that another year of this approach and the benefits of meaningful collaboration opportunities will demonstrate continued progress, with even more students meeting their goals. I am also optimistic that extra attention when grouping and planning for the ten students who did not meeting their goals can be leveraged for success. I am also hopeful that previously mentioned whole group instruction in growth mindset will the entire class, but particularly those students who did not meet their goals.

I plan to take what I have learned and apply this approach to all of my math classes next year. Next school year, I will use this approach with all of my math classes. I also plan to incorporate more technology and engineering ideas in math problems and instruction, including coding and student created "flipped classroom" videos in an effort to extend opportunities for students to talk about math content and share their thinking about how they solved a problem. Additionally, I will incorporate more interactive and online curriculum features to group tasks. Lastly, I will plan to conference with students who did not meet growth targets most frequently in the 2015-2016 school year. Although I am confident that these students are learning and growing in their math abilities, I want them to be able to feel the same success their peers have felt when they are able to demonstrate it on a standardized test.

Policy Recommendations

School Level:

1. Teachers will be provided quarterly opportunities to observe other math teachers in their building with a focus on differentiation and collaborative learning.
2. All math teachers will be provided time to meet monthly to discuss and share current content and differentiation and collaborative learning practices for the purpose of providing each other with assistance and feedback.

Classroom Level:

1. Students will have clear behavior expectations and consequences during collaborative learning in an effort to promote learning and on-task behavior.
2. Students will provide the teacher with feedback on their learning experience at the end of each unit to help shape their math experience and differentiation opportunities.

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