

MTIP Nugget

Engaging Struggling Grade 9 Math Learners

Ellen Ward & Michelle McLarty-Paul, Winnipeg School Division

Our Context

We teach grade 9 math and other courses at a grade 7-12 school in Winnipeg School Division. Ellen teaches a Grade 9 section that is streamed for students who intend on continuing into Essentials Math. Michelle teaches a low-enrollment section intended for students who have significant academic struggles and require a smaller class setting with additional supports. Historically, the primary concerns in Grade 9 math are the high number of students who re-take the course, as well as poor attendance in classes. In preparing for this school year, in looking at grades and receiving feedback about our students coming in from Grade 8, we knew we would have many students who were facing academic challenges. We therefore decided this course was one that required our attention and focused planning.

Our Goals

Both of us began this quest with two goals. First, how could we better engage our grade 9 math students? We wondered if there were alternative learning models, activities, and routines that we could implement in our classrooms to get students excited, thinking, and learning. Second, how could we help students who were struggling academically? We wondered how we could re-orient our focus to include more high-level thinking while still providing students with opportunities to build the skills required for engaging with problems effectively. Ellen's initial ideas were around potentially flipping the classroom, and learning about and implementing the cornerstones of Peter Liljedahl's "Thinking Classroom" model (Liljedahl, 2018). Michelle also wanted to continue learning about Peter Liljedahl's ideas, but also wanted to include targeted attention on determining where students were struggling and balancing re-enforcing those skills while at the same time exposing students to Grade 9 outcomes.

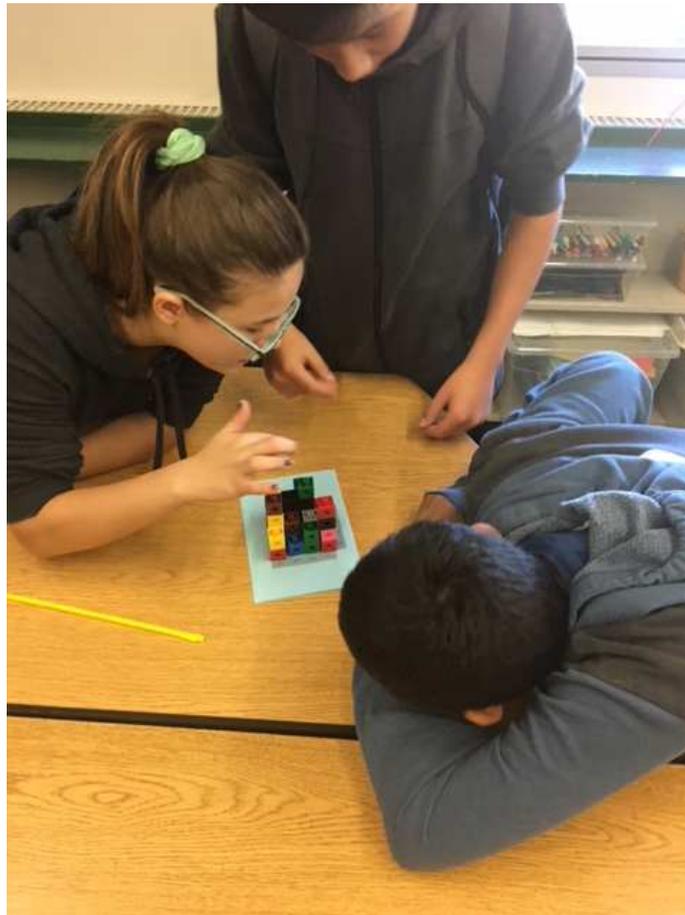
At the beginning of our quest, we planned to collaborate; sharing and implementing ideas in our classrooms. We planned to document the quality of our ideas, including strengths and weaknesses of the activities. We also intended to learn from our fellow MTIP members as they proceeded on their quests, some of which were similar to our own.

Ellen's Quest

As a first year teacher, I was excited and anxious about teaching my first group of grade 9's. I began the year approaching the curriculum and outcomes in a very structured, notes-oriented way, but quickly realized that with the group of students I had, this approach was not going to work. This led me to my quest: "How can I engage struggling grade 9 students in a variety of

ways that will not only further enhance their learning of the content, but develop their confidence in math?”

I began this quest two months into the school year by hosting a “Challenge Week” in my classroom. This consisted of a series of puzzles, games, and tasks that were more about teamwork, problem solving, and fun than they were about computational math. The first few days were quite rough, with a significant lack of confidence and enthusiasm from the students. However, around the middle of the week, they began to work with each other and started using problem solving skills they were not aware they had. By the end of the week, our classroom had become more collaborative and my students had gained more confidence. It brought a breath of fresh air to our stale classroom.



After Challenge Week, I decided to discard our notes booklets and try an approach more similar to Peter Liljedahl’s Thinking Classrooms. As a class, we tried various teaching methods, including group problem solving, partner quizzes, gallery walks, round-table discussions, student-made tutorials, and breaking apart assignments into smaller chunks. Each of these methods helped to improve the confidence of my students. Chunking assignments was highly successful because the students didn’t feel overwhelmed; I went from having 2 out of eighteen assignments handed in to fourteen out of eighteen. We also tried Peter Liljedahl’s “Vertical

Non-Permanent Spaces” approach, which was mostly successful. I found that students enjoyed being at the whiteboards, but were easily distracted and sometimes would not work with their group. However, I also observed more critical thinking and communication of ideas within their groups.

During this quest, I had successes that I can build on and struggles that I will have to continue to address. Many of my students came into my classroom with little confidence, both in themselves and in their math abilities. They also lacked perseverance when faced with a difficult problem, test, quiz, or other type of assessment. This meant that however much they were succeeding at an activity, group project, etc., many students were still unable to demonstrate their learning on an independent assessment (e.g., tests and quizzes).

While most of my students struggled this year with math, I have also seen them become more confident and engaged in math than when they started. Instead of apathy, I now usually observe engagement in the activity or lesson that we are doing in class. They continue to struggle with tests and quizzes, and working independently on assessments, but they have grown over the year to the point where they can enter their math class and not always doubt their ability. They are now willing to try whatever activity I have concocted for the day’s lesson.

Michelle’s Quest

In planning for the year with my grade 9s my goals were oriented around two broad questions. First, what curricular goals did I have for my students? Second, how did I want to achieve these goals? I decided to begin with the “What?” question by planning from the bottom up. I used the *Glance across the Grades* (Manitoba Education, 2016) document to trace each grade 9 outcome into a composition of prerequisite outcomes from grade 3 to grade 8. I then tailored my instructional goals accordingly. For example, the first grade 9 outcome that I wanted to focus on was comparing and ordering rational numbers. I decided therefore to begin my year with lessons about place value and whole numbers. Once I saw that my students had an understanding of the grade 3 to grade 6 outcomes related to comparing and ordering numbers up to one million, I moved forward to comparing decimals, integers, and fractions. In past years, I usually began with outcomes much closer to grade 9; for example starting at fractions or integers, and then filled gaps as I went. Starting at a more basic level of understanding allowed for a much better flow in determining where students were struggling and addressing these concerns before forging ahead. I continued with this structure for each unit as the year proceeded.

Overall, I found this change in what outcomes I taught in order to respond to student learning needs to be successful. The only drawback was that it took much longer to complete the course outcomes. I did not have time to address every grade 9 outcome, despite the course running for the entire year. I made decisions about which outcomes I needed to focus on based on preparing these students for Essentials Math, which was their likely math stream.

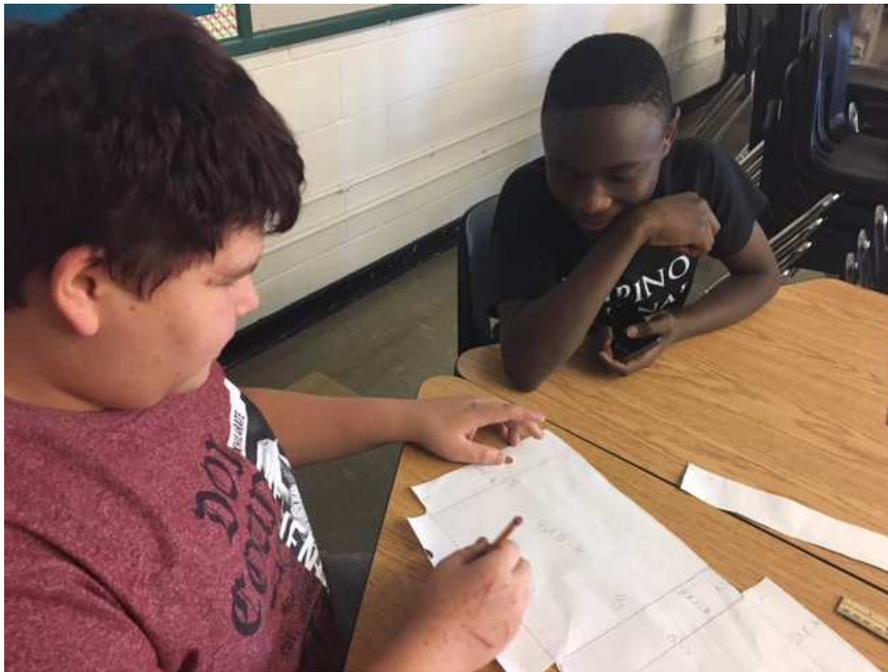


In addressing the “How?” pillar of my quest I decided to try several instructional methods. These methods included visibly random student groupings, non-permanent vertical surfaces, and good problems, based on two workshops I attended lead by Peter Liljedahl. Upon trying these ideas, I found that some worked and some did not. I also found that some worked on certain days, but not on others. I found it difficult to predict what may work versus what may not. What I did come to realize, which surprised me, was that my students seemed to respond quite well to variety. While consistency in my expectations for effort and respect was important, a routine in terms of what we did each day was not as important. We therefore spent some days working at the whiteboards, some days working at desks, some days we did puzzles, and some days we played games. I tried to offer students a variety of skill practice mixed with opportunities to do “big picture” conceptual thinking. Overall, it took at least 3 months to establish an effective classroom culture where most students were moving forward each day. By the end of the year, the majority of my students were willing to engage with math on a daily basis.

Ongoing Challenges

Despite our successes, we still face some ongoing challenges. Perhaps the most difficult challenge was cultivating our student’s ability to make progress and connections independently. We both found that we needed to intervene a great deal when it came to helping students make connections between the activities they were doing and the consolidated learning we were hoping for them to achieve. Students could successfully work through a good problem or an engaging activity, but then could not connect what they just did with the learning outcome we had in mind. Each of us tried different methods of helping students make those connections, with mixed success. For example, Ellen tried to have

students consolidate by writing “Notes for my Future Self”. Michelle tried to provide students with note frames to record important findings, explanations or diagrams from the activity. While each of these methods worked to a certain extent, we found that our students were not able to get to a point of doing this consolidation more independently, as it more often had to be teacher directed. Students also did not refer back to these materials as frequently as we would have liked. This struggle in consolidation also reflected itself in our students’ assessments. Despite great work that students would do in groups or at whiteboards, students had a hard time demonstrating their understanding on assignments, quizzes, and tests when they needed to work independently.



We also want to continue working on developing our students’ perseverance. Just as students struggled to consolidate their learning independently, we found many students relied heavily on our guidance and assistance to navigate progressively more difficult problems and activities. We believe much of this has to do with students’ lack of confidence and concern about making mistakes. Despite activities that were designed to have students explore and discover, with many possible paths to get to a solution, these students still tend to see math as a subject with one correct path and one correct answer. They also tend to believe that teachers are the only source of correct answers in the classroom. We found our students asking for our reassurance that they were “doing it right” and direction for what to do next before proceeding.

How will we continue our quests?

Given our successes and challenges, we feel that we still have areas to explore and improve on. Some of our main areas of interest are:

1. How can we develop students' perseverance? How do we encourage them to have confidence to push themselves forward without worrying about making mistakes? How do we encourage them not to perceive teachers as the only ones with "the answers"?
2. How can we assess differently? What methods may work better for our students? What methods allow for more flexibility in how students demonstrate their understanding?
3. What resources can we find/develop to continue enhancing our teaching and therefore our students' experiences? Who can we learn from and share with?

Overall, the journey we have taken this year with MTIP has been one that has been insightful and rewarding. It has encouraged us to continue moving forward as we continue on our quest to engage and support our students.

References

Liljedahl, P. (2018). *Building Thinking Classrooms* [PowerPoint Slides]. Retrieved from <http://www.peterliljedahl.com/presentations>.

Manitoba Education and Training. (2016). *Glance Across the Grades: Kindergarten to Grade 9 Mathematics* [PDF]. Retrieved from http://www.edu.gov.mb.ca/k12/cur/math/glance_k-9/index.html.