

Success for All: Student Report

Stephen McCarthy – McGill University

“Stu” – Grade 10 Mathematics, Science option (SN-4) at Beurling Academy

Stage One – Background

Stu is a student in my Math 10 class at Beurling Academy. The school, on the border between Verdun and Lasalle, serves a student population which is culturally diverse though economically disadvantaged; Beurling earns the second-lowest score on Quebec’s socioeconomic indicator scale (9 out of 10) and receives money from the provincial government’s New Approaches, New Solutions (NANS) program.

The science option (SN-4) math class is informally considered the higher of the two Grade 10 math options and attracts students who are on CEGEP track. However, at Beurling it is difficult for many students; throughout the Lester B. Pearson school board in 2012 the Math SN-4 had approximately a 90% pass rate, while at Beurling only around 50% of students passed. The class of 29 students demonstrates great engagement and is a positive learning environment.

Stu came to my attention about a month into my field experience. His grade dropped precipitously on his second unit test and I worried that he was in danger of losing motivation and failing the course. Like many students in the class, he demonstrates some difficulty with mathematics learned in previous years, the building blocks of our curriculum. I selected Stu because, in addition to his risk factors, he displayed a hint of resilience and genuine interest in mathematics which I hoped to encourage.

Case concerns to be addressed

1. Motivation and mathematical curiosity
2. Attention to mathematical detail
3. Prior mathematical knowledge
4. Accommodation of learning style

Note: While I have observed Stu’s class since the beginning of the year, I only started teaching it in mid-October at the start of Unit 3, so this report will mainly reflect my four weeks of teaching with the class.

Stage Two – Student Profile

This section documents Stu as he was in mid-October, as I started teaching the class. Anecdotal examples and specific examples from his first two unit tests will be used to illustrate concerns. The previous teacher's style will be briefly described as it applies to Stu.

Stu is a good natured guy who has many friends in the class. He is respectful towards his peers and teachers and does not disrupt classes. Though he does not ask many questions in class, he often asks clarification questions outside of class time. In math class, his strengths are his desire to understand math at a conceptual level, and his curiosity to expand his mathematical knowledge beyond the level of the class. His weaknesses include speed and sloppy execution: though he appears to be methodical and slow, he often makes careless math mistakes. He also struggles with some prior math knowledge required as basic knowledge for the course.

Stu has no IEP and no disabilities known to me. His learning style is social, verbal and conceptual. He enjoys talking over problems and concepts with his friends, thus socially constructing his knowledge of the mathematics. He often seeks external validation of his work, either from the teacher (coming to ask me after a question whether his arithmetic is right) or his peers. As I allude to above, Stu is also methodical; if he does not understand a question he will work at it or seek help until he can do it right.

Details and examples of case concerns

Concern 1: Motivation and mathematical curiosity

- Stu's test marks dropped from just above average (69 with a class average of 67) to below average (44 with an average of 57) from unit test 1 to unit test 2.
- He did not generally ask questions in class and sometimes seemed unengaged or confused.
- Before I started teaching his class, his teacher made the class available at lunch and before school; he would sometimes come to do his math work with friends.

Concern 2: Attention to mathematical detail

- Both unit tests 1 and 2 demonstrate relatively frequent mistakes in arithmetic. Test 1 # 8b and test 2 # 1c are good examples of this.
- Observations of Stu's homework (not included) show that he sometimes drops numbers or variables from calculations, even when he has the right concept.
- Stu sometimes does not seem to know which concept to apply to a question, and thus does not approach it successfully. Test 1 #b is an example where he missed the correct approach of difference of squares.

- It has been the teacher's practice to have the students check their own homework against an answer booklet they are given in order to correct their own mistakes and practice their procedural knowledge.

Concern 3: Prior mathematical knowledge

- Stu's knowledge of exponents (particularly fractional and negative exponents) is weak. Test 1 # 4 and 6d demonstrate this.
- Before I started teaching, his teacher used the first unit to review exponents and review prior knowledge.
- The math department has discussed implementing a diagnostic test for Grade 10s, but this has not been implemented.

Concern 4: Accommodation of learning profile

- On Test 2, Stu left two questions (# 4 and 5) blank, but whether due to lack of time or understanding is unclear.
- On some test questions, Stu stops his answer and indicates that it continues with an ellipsis. Test 1 # 1a, 2c and 2e are examples of this. This is probably due to lack of time to finish.
- The class has been very teacher-centric with a routine of note-taking and homework done individually. As mentioned, Stu doesn't often directly engage during the formal class time. His teacher did support him by offering help before school and at lunch.
- Before I started teaching, time was a major constraint in assessment.

Stage Three – Strategies to Date

This section documents the strategies I have been using to resolve the four case concerns. I have been more successful in some areas than. Stu's assessment situational problem, third unit test and examples of his notes and homework in the last month will be used as documentation.

While I have been the primary classroom teacher for the last four weeks, I am still working within the framework of my cooperating teacher. I think this is overall a very good framework and includes some great student supports as described in Stage 2; however, there are a few things I would change (such as guaranteeing the ability to do retests) in my own classroom which I have not implemented for this class.

I have organized my supports and interventions into a roughly chronological table, with additional cross-reference to whether the change was to instruction, evaluation or support, and which case concern(s) it addressed. Since I was not teaching the class at first, my first steps were to support Stu's motivation and curiosity (Concern 1). Once I started teaching, I took steps to accommodate diverse learning profiles (Concern 4). Finally, as the other two concerns have been more evident I am starting to take steps to improve Stu's attention to mathematical detail (Concern 2) and prior knowledge (Concern 3).

Interventions and Supports

Approx. start date	Instruction assessment support	Case concern addressed	Description of support or intervention	Effectiveness with examples where possible.
Early Oct. (before starting to teach)	Support	1	Early on, I started helping my CT with the extra help before school and during lunch. I have tried to improve on this by encouraging the students to work socially and by circulating among the student desks rather than sitting at the front or back of the room.	Stu and his friends have increased their attendance and now come almost every day before school and often at lunch. They seem to come as much for the social aspect as the math, but also get work done.

Mid-Oct. (teaching week 1)	Support	1	I have tried to encourage Stu's interest in mathematics by exposing him to advanced mathematics and discussing mathematics conceptually with him and his friend group.	I am very pleased with Stu's progress conceptually. One day at lunch, he asked about how to find the slope of a quadratic function, which requires calculus. He was very engaged when I derived the derivative of the basic quadratic from the principles of limits. After the situational problem, I overheard him discussing the correct conceptual answer with friends in the hallway.
Mid-Oct. (teaching week 1)	Instruction	4	I have been trying to engage the students more in the process of note-taking and doing examples. Examples: <ul style="list-style-type: none"> • Asking a question and waiting for 10 hands • Cold-calling specific students to answer questions (unless I know they are uncomfortable) • I stop regularly and ask if there are any questions 	This has been working well for the entire class as I see engagement levels rising. However, its effect on Stu is unclear. He generally is able to respond well to cold-calls but still doesn't usually ask questions in class.
Mid-Oct. (teaching week 1)	Instruction	2	I have been trying various methods of making the math concepts and procedures "sticky" for the students. These include: <ul style="list-style-type: none"> • Fun catchphrases such as "cancellation for the nation" or "Team Factor" • Labeling steps and reminding students of the steps each time we do the procedure 	Stu's improvement on his third unit test (44% to 71%) may be an indication that this is working to improve his attention to detail; however, I cannot show a direct link. His note-taking in class (e.g. Zero Product Principle lesson) shows that he is paying attention and taking note of my step labels.

Mid-Oct. (teaching week 2)	Support	4	As Stu learns best by discussing and by constructing knowledge with others, I have encouraged his friend group (and the rest of the class) to discuss questions among themselves. For example, I will sometimes give the group a sample question and then not give help so they work together.	I have seen Stu grow both mathematically and socially in the last month as his group discusses the mathematics they are learning. He now often leads these discussions as his conceptual knowledge grows.
Mid-Oct. (teaching week 2)	Assessment	2, 4	My CT and I gave a small situational-problem like challenge for the evaluation of Mathematics Competency 1 (“Solves a situational problem”). We did this to emphasize the students’ conceptual knowledge and mathematical imagination in our assessment, not just their ability to perform calculations.	Stu’s situational problem answer (included in the documentation) shows his advantage in the conceptual understanding, and my CT gave him a 90% (compared to his best test mark of 71%). He was able to understand how the reference to Gauss’s work on the description applied to the problem at hand—the only student in the class to do so!
Late Oct. (teaching week 3)	Instruction	3	Realizing that Stu and other students have issues with prior math knowledge, I have been starting to teach mini-lessons on prior knowledge as required during lessons. The best example was during my lesson on Nov. 1 (Lesson Plan included) when I broke from the LP to teach the sign of a function and how to write interval notation.	It is hard to determine the impact of this change on Stu’s basic math knowledge directly. However, his third unit test score suggests a somewhat positive impact. For example, on test 3 #3 he correctly implemented both the sign of a function and interval writing (though he made an arithmetic error and a different minor conceptual error), showing that the Nov. 1 micro-lessons had some effect.

Early Nov (teaching week 4)	Assessment	4	In writing the third unit test, I wanted time to be less of a factor than how much conceptual and procedural knowledge the students had, so I slightly shortened the test by taking out repetitive procedural questions and adding a problem where the students had to construct the math from a written situation. I also constructed the marking scheme to award partial marks for understanding and method.	I believe these changes benefitted Stu as reflected in his best test mark yet (71%). His conceptual understanding helped him score 4/4 on Question 4 and 5/6 on Question 5, both of which many students struggled with. (I haven't marked all the tests yet but I suspect the median mark will be 1/4 for #4 and 1/6 for #5.)
--------------------------------	------------	---	--	---

Formative evaluation results (organized chronologically)

Math competencies are C1: "Solves a situational problem", and C2: "Uses mathematical reasoning."

Date	Evaluation (Math competency)	Stu (%)	Class Average (%)
Sept 10	Test 1 (C2)	69	66
Oct 9	Test 2 (C2)	44	57
Oct 16	<i>Start of my teaching the class</i>		
Oct 26	Situational problem (C1)	90	67
Nov 8	Test 3 (C2)	71	Not all marked; unlikely to be more than 60%.

Stage Four – Conclusions

(Note: While I have been working with Stu for four weeks and collecting the information included in this report, the conclusions here are naturally my best understanding of Stu's educational progress and needs, and do not reflect a number of factors such as family background or achievement in other classes. It is difficult for me to be certain that his progress is due to my influence and not to external factors; however, I will draw what conclusions I can from the data available.)

When I started teaching his class four weeks ago, Stu seemed to be at a crossroads; with a poor test mark and poor class participation, he could have become one of those who slip into apathy and spiral downwards. However, due mostly to his own tenacity and interest and perhaps due to my interventions, he has retained his core curiosity about mathematics and worked on fixing his weak points. With the teaching slightly more attuned to his social, verbal and methodical learning style and a welcoming and constructive atmosphere before school and at lunch, he is participating more and doing and discussing math with his friends. His two recent marks reflect this improvement, and I am confident this success will feed his desire to learn more.

I remain concerned about our case concerns 2 and 3 since I have been less able to address these through instruction and evaluation. I continue to see evidence that Stu is held back by arithmetic mistakes and struggles with prior knowledge. These issues are not limited to Stu, so I would like suggestions on strategies to address these further from the case conference.

While I believe the groundwork is laid for Stu's success, there are several things that his teacher can continue to support him with after my departure in December. It is her practice to welcome students before school and at lunch, and she should continue to welcome Stu's friend group even if they socialize while they do math. She could continue my practice of trying to make the concepts and steps "sticky" in students' memories by giving them memorable names. As well, in assessment she could continue to focus on conceptual knowledge and reduce the factor of speed in assessment (while balancing with the demands set by the year-end government exam).

Overall, I am now confident that Stu will succeed in mathematics this year. While he continues to have areas to work on as noted above, I am impressed with his attitude, evident interest in mathematics and desire to learn.