

MAKING REAL WORLD CONNECTIONS WITH STUDENTS



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By: Rita Gipp and Travis Duffy

What is the most frequent question asked in the Algebra classroom? It very well might be, "When are we ever going to use this?" Making connections between the classroom and the outside world prove to be beneficial in motivating students to an elevated level of performance.

The Need to Make Connections

While the question might seem to ring in the air of defiance, a quality educator realizes that a student's need to make connections between classroom concepts and the world in which they live is actually a desirable quest. It demonstrates higher level thinking – a desire to give reason and purpose to the task at hand. By providing answers to the question, and making worthwhile connections, the teacher has the ability to turn the question into a highly valuable inquisition.

A Teacher's Point of View

The task then, is to answer the question in a manner in which students find purpose. I pondered. In making connections between what is being taught and the real-world around them, a valuable tool to use is role modeling. There are many examples in the community in which surely career-minded individuals would be able to relate how Algebra is used in the working world. I could bring in a guest speaker to relay personalized examples. I began my search on www.careercruising.com, a site our school district uses to make connections between volunteers in the community and teachers who could use their role-modeling resources.

In the midst of my search, trying to decide which careers to pull in that would provide the most connections between my student population and adults working in the community, I had a revelation. What I really needed was someone with whom my transescent students could most closely relate, and for this age group, the one most important influence in their lives lie within the values of their own peer groups. Who among them might be able to talk with authority on the value of Algebra?

It took me two seconds for the name Travis Duffy to enter my mind. Travis had been a student of mine two years earlier. I had a continued connection with my former student, keeping in frequent connection with what was happening in his life in terms of his ongoing quest for technology and development of his skills.

There were an abundance of examples I could think of immediately with which Travis would be able to relate real application of Algebra to his everyday world. Even better, I knew the examples Travis would be able to provide were in areas of high interest to my students. Travis had been (and still was) a member of our county's *Rock N' Robots* club. Through communication with the leaders of the club, I knew that raw coding was used to program the robots. Any programming language can be easily connected to the application of Algebra with its systematic lines of code.

While still in middle school, Travis had intermittently shown me his progress with his ongoing quest to create his own operating system. He even created a business name, "Galaxy Programming." Since middle school, Travis had published at least one app on the Windows Store that I was aware of. **That** would surely impress my students!

I talked to Travis. He was all for helping to make connections for my students and we scheduled a time for him to share his view of how Algebra is used in his daily life. I gave Travis a little outline of my ideas of how I knew him to use Algebra in his world and left it up to him to put together a quality presentation. That he did!

The Presentation

Our plan was to have Travis speak to us via a Cisco telepresence machine, a video conferencing tool that allows physically distant participants feel as though they are in the same room with one another. As luck would have it, we had a glitch with that plan on the day of the presentation, but in a perfect example of quick problem

solving, Travis took out his phone and connected to us via Google Hangouts. I attached a webcam and microphone to the classroom desktop, and we had Travis projected up on our Smartboard®. For subsequent presentations that day, Travis was able to connect to us from a computer in the high school library for a clearer view of his presentation.

The following is in the words of the classroom guest speaker, Travis Duffy:

Robotics

I am a member of the “Rock N’ Robots” robotics club. Participating in that group requires a lot of skills, including engineering and math. Because we have members that are really good at math, we won the 2014 Lake Superior Regional competition in Duluth, MN. Additionally, our team competed in a competition at Massachusetts Institute of Technology where we finished fourth in the nation. The MIT competition featured code from Rock N’ Robots being sent to the International Space Station where it was used to control robots.

Mission: To serve our community by educating every child.

March 14, 2014

Rockin’ Robots Wins 1st Place at Regionals

The Rockin’ Robots walked away with the first place trophy Saturday, March 8, 2014 in Duluth, MN at the Lake Superior regional competition. The win qualified the team for the nationals slated for April in St. Louis.

The Rockin’ Robots is a robotics team open to students at any Rock County high school. Currently, the team is made up of 15 members, 13 from Parker and 2 from Craig. The faculty advisors, Bob Getka and Tom Heiss, teach at Parker.

Programmers from the same team recently finished fourth in the Nation at an event at The Massachusetts Institute of Technology. The MIT competition featured code from the Rockin’ Robots being sent to the International Space Station where it was used to control robots.



March, 2014 Superintendent's Weekly Update



During competition, code was sent to robots at The International Space Station

We use math in many ways in our robotics group. Programming the robots requires application of math in many ways, most notably with the use of mathematical formulas within lines of code. Additionally, analyzing lines of code is similar to working step-by-step through lines of solutions in algebraic equations. The process of locating an error in code

replicates the process of finding an error in lines of algebraic solutions. Building the robots also requires math as it applies to the engineering of the design.

During competitions, we had to use math in order to help the robot make decisions that would ultimately get us points. Our team also used math while building the robot by planning dimensions and angles for different apparatus on the robot. Calculations were made to determine correct speeds and angles when throwing things like balls and Frisbees to make goals during competitions.

Shape Helper

Geometry has never been so easy

Shape Helper App available at the Windows Store
<http://apps.microsoft.com/windows/en-us/app/shape-helper/2f504447-35b6-46c5-b966-fb0d7ddcfcea>

I also made a program that helps people solve equations for shapes called *Shape Helper*. *Shape Helper* can find the area, width, surface area, and volume of any shape that has 3 - 9 sides. All you would need to do is enter the height and width of the shape to get the area and perimeter. If you wanted the volume and surface

area, you would type the length, width, and height. I used math while developing this program by converting equations to simplified versions a computer would understand. All of the code I made to solve problems for the user were written step-by-step. When I developed this program, I separated every part of the fraction in order to easily find errors that could occur during the debugging process. If I had crammed everything together in one line, it would have been hard to figure out where I made my error. It is the same in Algebra; if you make a mistake without writing everything out and showing your steps, it will be very difficult to find where you made your mistake and fix it.

Careers

There are so many careers out there that require math, even if you are a chef or fashion designer! Chefs have to be good at measuring and adding fractions, while fashion designers have to be good at algebra and measuring. Below is a list of careers that require a strong math background:

Artist	Doctor
Photographer	Fashion Designer
Jewelry Artist	Astronomer
Chef	Science Journalist
Animator	Meteorologist
Special Effects Director	Environmental Consultant
Computer Scientist	Stock Broker
Game Designer	Interior Designer
Astronaut	Car Designer
Cryptanalyst	Petroleum Engineer
Statistician	Aeronautical Engineer
Architect	And many, many more

Unexpected Takeaways

While speaking with Travis during the presentation, there were a number of valuable takeaways that took the initial desire to simply provide examples of math in use to a level beyond application of course content.

Travis now works part-time for our school's IT department. I brought this up during the presentation so that students might witness the potential monetary value of hard work and development of skills. Most of these fourteen year olds can't wait until they have a job and their own spending money. I remembered a conversation I had with Travis over the summer about how he had spent the day ticking and un-ticking check boxes within a new program the district had installed. Surely this was a mundane, yet necessary task, and provided a wonderful example of how all jobs come with some less than desirable duties.

Travis was able to reiterate that he loves his job with IT, and that yes, it does at times come with responsibilities of providing service wherever service is needed, not just what he wants to do. I included in discussion some of the tasks that come along with my job as a teacher that I don't enjoy doing, and summarized by making a connection to their role as students. Some classes naturally interest them more, but in proper preparation for future success, it's important to complete the daunting tasks along with those that excite them.

Another valuable point of reference came on the tails of talking about the application Travis had published at the Windows Store. According to the Stanford University Marshmallow Experiment (1970), it is innate to prefer immediate gratification of lesser value than to delay the gratification, even when the delay is short term and the reward is doubled in value. This is a concept that needs to be

taught and experienced to be understood and valued. Travis was able to discuss his purpose for making his *Shape Helper* app available to download for free, drawing attention to the end reward once a newer, more robust version of the tool was made available for purchase.

A final connection I found necessary to make was in respect to Travis being an average, but hard working student. I wanted to eliminate the possibility of my students viewing Travis as someone who must be skilled beyond their own potential; a born genius, if you will. Travis is a good student, and as I remembered, he was part of the Algebra class. That year, 8th graders participated in either 8th grade Math, Algebra, or Geometry, with a large majority assigned to 8th grade Math, the class targeted for average achievers of their grade level. A few mathematically gifted students participated in the 9th grade Geometry class while students showing promise were advanced more subtly, to Algebra. Travis was an Algebra student, the same as those in his audience the day of the presentation. The desired message was that Travis was simply a dedicated student, reaping the successes of his own hard work.

Summary and Closing

An experienced teacher is able to tell when students are engaged in a presentation or lesson, or when they are simply participating idly as polite audience members. There was no doubt at presentation end each hour that students were completely engaged. In fact, Travis sent me a copy of a message he received from a student the evening of the presentation. It read, "Do you REALLY use Algebra every day?" In response, I'm compelled to pose a follow up question. Do you think this student would have felt comfortable sending the same message to an adult speaker who was brought in to share how he uses Algebra in his career?

In making ongoing connections with students, it is most valuable when those connections relate not only to the world they see around them, but the values they exhibit within. Role modeling is proven to be an effective tool in helping students to develop an intrinsic idea of what is possible for their own futures. If the opportunity exists to provide role-modeling from within their own most valued and influential group – their peers – the lasting effects of the messages conveyed are multiplied. In the experience shared herein, mission accomplished!