THE EDUCATION FUND

FOR EXCELLENCE IN MIAMI-DADE PUBLIC SCHOOLS

2023
2024

Ideas with IMPACT

STEM/MATH

MATHSTERS OF THE CALCU-VERSE

IDEA PACKET SPONSORED BY:

ASSURANT®

STEM

Mathsters of the Calcu-verse!

(Implementing 3D Printing, Algebra Tiles, Graphing Calculators, and Superheros in the Math Classroom)

"Relatable cultural references foster student excitement and interest in math"

Disseminator: Walter Busse, PhD
DrBusse@dadeschools.net
Miami Beach Senior High School Code: 7201

For information concerning ideas with IMPACT
Please contact:
Ideas with IMPACT Program Director

Audrey Onyeike
The Education Fund
305-558-4544 ext 113
Email: audrey@educationfund.org
Website: www.educationfund.org

Table of Contents

Background

As a longtime music educator and administrator of the arts, I have always subscribed to the simple fact that students who care about and are interested in the subject matter will obviously do better than ones who are apathetic or exhibit negativity. Throughout my 30+ years of teaching music, I would oftentimes encounter students who are already passionate about the subject. Almost everybody loves music! However, as fellow mathematics educators, you all already know - not so much with math though!! One of the most insightful observations I feel I have made of my students, is that those who are able to make relevant and meaningful connections among their various classes will be the ones who succeed the most, both academically and in life. Much too often is the unfortunate case where students have a negative experience with math in their formative years, and, early on, they forge the notion that 1) math is boring, and 2) they are no good at math. Until these two obstacles are addressed, they will always remain at a disadvantage.

This project, “Mathsters of the Caclu-Verse” was initially designed in an attempt to capture students’ interest and excite them in learning math by incorporating relatable cultural references and capitalizing on the current popularity of the superhero craze. By re-imagining their favorite characters as actual 3-D printed action figures interacting within word problems and using 3-D printed algebra tiles to “build and save the universe,” students would hopefully become more proficient in three key areas: 1) Using graphing calculators; 2) Applying the algebra tile methodology in solving equations (and simple math problems); and 3) Proclivity in solving word problems without fear or apprehension. This idea would, with any luck, begin a long journey to help students gain not only gain more self confidence but also actually begin to enjoy math class along the way. The implementation of the 3D Printer and the “cool factor” was designed to allow for differentiated instruction, engaging a wide range of students from the highest levels of achievement to those who struggle to maintain any kind of engagement.

Goals and Objectives

The two primary goals of this project were to 1) change the overall attitude toward algebra from apathy to ANY amount of interest in the subject, and 2) hopefully implement strategies which would increase the students’ self confidence in the subject of math/algebra. The objectives were to be achieved via four related, yet distinct facets which are presented and discussed here: 1) the introduction and use of a 3D printer in the math classroom, 2) the introduction and use of algebra tile manipulatives (printed

using the 3D printer) to help students gain a more concrete understanding of largely abstract concepts (both in algebra as well as remedial 4 function calculations.) 3) The introduction and use of both physical (TI-84) and virtual (desmos) graphing calculators to enhance understanding using visual representations of equations. 4) Applying "superhero" characters and crime fighting scenarios to already existing word problems as a means of sparking interest and gaining relevance from otherwise apathetic students.

The six main goals for TEACHERS attending today's LEARNING EXPO are as follows:

1) Teachers will be able to understand basics of 3D printing - including a basic overview of how 3D printers work, various file types used, finding premade templates vs. creating your own designs using CAD software, tips and tricks finding the right printer for purchase and actual printing.
2) Teachers will explore and discuss various ways to use 3D printing in the math classroom for 1, 2, and 3 dimensional applications, in basic arithmetic, algebra, geometry and higher level mathematics. When is it worthwhile vs. when it may not.
3) Teachers will explore and discuss various ways to use algebra tiles in the algebra classroom. Is it worthwhile or not?
4) Teachers will explore and discuss various ways to use virtual and physical graphing calculators in the math classroom for 2 dimensional algebra applications. When is it worthwhile vs. when it may not.
5) Teachers will explore and discuss using "superhero" characters and crime fighting scenarios as a means of sparking interest and gaining relevance. Is it worthwhile or not?
6) Teachers will be presented with results and takeaways observed over the course of this project and final discussion and sharing of ideas that may be worthwhile when applying for the available $400 Education Fund Adapter Grant.

Florida Standards

Note: Because this project can be presented in the various academic disciplines and math levels including one dimensional (four function) arithmetic, single variable algebraic expressions, two dimensional algebra, three dimensional geometry and higher level math courses, the following Florida State Standards are ut only a few which can be applied with slight variations across the grade levels and curriculum spectrum.

MAFS.912.C.1.1 Understand the concept of limit and estimate limits from graphs and tables of values.

MAFS.912.A-REI.3.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

MAFS.912.F-LE.1.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.

MAFS.912.F-IF.3.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

MA.912.AR.3.5 Given the x-intercepts and another point on the graph of a quadratic function, write the equation for the function.

MA.912.AR.3.6 Given an expression or equation representing a quadratic function, determine the vertex and zeros and interpret them in terms of a real-world context.

Lesson Plan

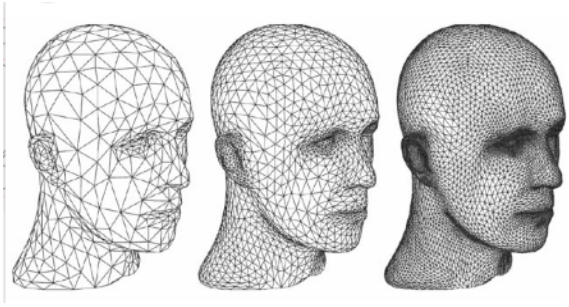
Part 1: Demystifying CAD, 3D Printing and 3D Printers

Even though I consider myself a seasoned “techie”, I was, to be quite honest, a bit surprised at the learning curve I encountered when trying to teach myself about 3D printing. I had watched a ton of YouTube videos, read through numerous books and did my due diligence with internet searches, but until I actually started printing, the concepts were difficult to sink in. As such, I will try to distill the topic down to the most basic principles as succinctly as possible.

What exactly IS 3D printing? Really all it is, is a whole bunch of layers of 2 dimensional printed “slices.” Let’s imagine we are teaching Geometry and did NOT(!) have a 3D printer, but still wanted to make our own very simple plastic ice cream cone 4 inches tall with a base diameter of 1 inch. Being resourceful we turn to a typical glue gun. We will first just heat up the fine tipped glue gun and simply draw a 1 inch circle on our desk. Even though it is just a 2 dimensional “drawing”, we know our glue will dry to be a few millimeters thick. We wait for it to dry and then, very carefully, draw another glue gun circle right on top the first one, but just a tiny little bit smaller. We wait for that to dry and repeat the process, each time progressively making smaller circles on top of the existing layers until eventually, they converge to be a point, and, alas we have a hollow hardened-glue “ice cream cone”. Depending on how fine tipped the glue gun is, it would determine 1) how many layers you would need, and ALSO 2) how thick the shell is. If you had a very fine tipped glue gun and wanted a thicker shell, then each circle layer drawn would have to have a thicker line.

Now what if we wanted the cone to be completely solid? On your first layer you would have to draw the circle and then “color it in”. Each subsequent layer would also have to be colored in and when you are done, the cone is completely solid, but you would also have had to use up quite a few glue sticks!

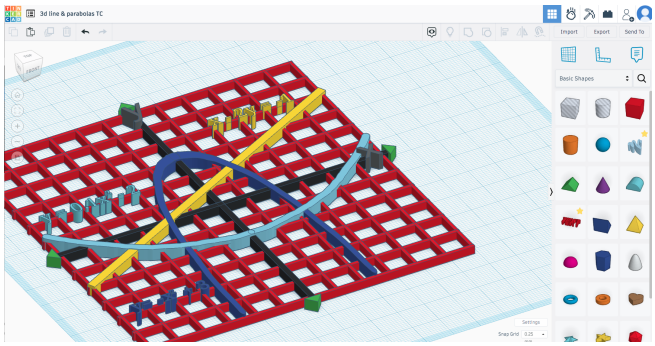
This is basically how ALL commercial 3D printers work, but, instead of melting glue sticks in a glue gun, it melts plastic filament, usually rolls of 1.75mm “PLA” or “poly-lactic acid”, through a super fine tipped “extruder.” It also can be very precise with each 2 dimensional drawn layer or “slice.”

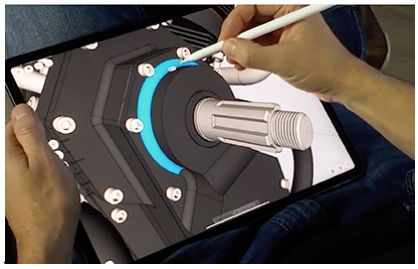


In practice, first you need to acquire an “.STL” (“stereolythography” or “Standard Triangle Language”) file containing mathematical formulas describing any 3D object using a map of all triangles. In our example above, a cone can be constructed quite simply. Literally thousands of premade STL file downloads are readily available

online for free or quite cheaply, (similar to clip art) at sites such as Thingiverse, Cults3D, Sketchfab, or others which can be found via simple google searches,

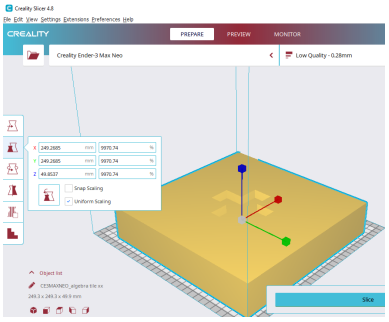
If you cannot find a specific pre-made STL file for your needs, you will then have to create your own 3D model using CAD (Computer Aided Design) software, which will export .stl files. Fortunately, what used to be an EXTREMELY COMPLICATED and DIFFICULT endeavor, we now have kid (and teacher) friendly free programs such as www.tinkercad.com (see right). This allows for a very quick and easy way to design simple models, even for a newbie. For more professional level design, I found an amazing program





www.shapr3D.com (left) that, while normally costs $25/month to use, has a hidden option for educators to create a pro account FOR FREE!!

It is important to understand that the .stl file is just the mathematical formulas which define the conceptual 3D shape or model. It does not include descriptions of all of the options in order to actually 3D print. The .stl file needs to be imported into a “slicer” program (left), that takes the conceptual object and creates a file that your specific printer itself reads in order to know the actual instructions to do the work. In our cone example, we need to define specific size, orientation, skin thickness, fill pattern, fill percentage, resolution, “support beams”, print speed, layer thickness, temperature etc. While all of these options are, without doubt, overwhelming, the good thing is they offer presets that can later be tweaked if the 3D printed result is not satisfactory.



A quick note on “overhangs” and “support beams”. With the cone example, it’s easy to envision how the shape is realized. However, if you consider a different shape of the letter “T”, the printer can easily build the center “I” beam, but if it tries to “print” the top crossbeam, it has nothing to put the layer on top of. In order to print this “overhang” the software will intelligently realize that it will need to first print necessary “support beams” all the way from the bottom layer up to where the overhang exists. Later, after the item is printed, these support beams are actually broken off from the form. Of course, the easier solution would be to flip the “T” upside down so the crossbeam is printed on the bottom layers and would negate the need for any support.

While all of this can be overwhelming, rest assured that the entry level printers are getting easier and easier to set up and get working right out of the box for a novice.

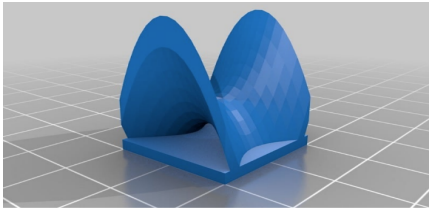
Part 2: 3D Printing in the Math Classroom? (Worth it or not?)

How can you actually USE a 3D printer in a math classroom? First, we must acknowledge that our various math worlds exist in different dimensional universes. All basic four function arithmetic calculations operate along a one dimensional number line. Algebra is where we usually introduce the Y axis where expressions can be represented on a 2 dimensional cartesian coordinate plane. It really isn't until Geometry where a third "z" variable takes us into a three dimensional reality. As such, applying a 3D printer to single and 2D principles may at first seem not viable, so a bit of teacher ingenuity may be prudent. One of the most useful tools in the tinkercad program is that ANY 2 dimensional art, text, or in our case number lines and/or x/y "printouts" can be imported into the tinkercad program and "extruded" into a three dimensional model which can then be printed.

Secondly, any educational practices (within really ANY subject) that might benefit from manipulatives, can be customized and printed at little to no cost in resources, though they DO take extremely long times to actually print!. These would include algebra tiles, Montessori counting blocks, fractional pies, etc. The possibilities are endless. In practicality, though, with my own personal experience, because the 9th grade algebra pacing guide is so intense, it leaves little to no space within the limited instructional time to really incorporate ANY opportunity for new and innovative applications. Plus, as stated, what I was not expecting, is the downside that ANY 3D printing to be used for individual manipulatives for class sets is not practically feasible since it requires TONS of time, not only for the long learning curve, but actual printing takes FOREVER. The smallest little object, even at a low resolution and barely any infill, still takes HOURS to print. And, the printer needs to be always monitored during the print. If there is an error, you could easily end up with a 3D spaghetti mess!

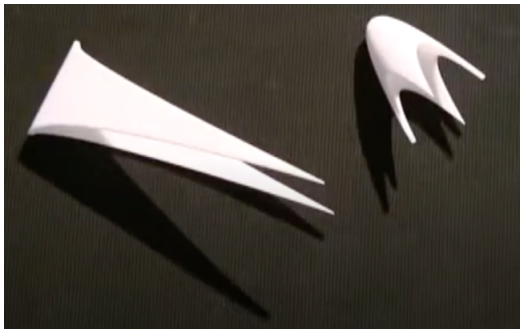
For the geometry classroom, as well as more advanced math courses that do venture into the 3D xyz coordinate universe, there is a plethora of resources available online, and, while not implemented in my algebra class for this project, are definitely worth exploring with a few examples shared below (with links).

Tactile Math: Teaching Advanced Mathematics with 3D Printing
https://www.simplify3d.com/tactile-math-teaching-advanced-mathematics-with-3d-printing/



3D Printed Hyperbolic Parabola STL file.
https://www.stlfinder.com/model/hyperbolic-parabola-0JFR48bD/2460953/

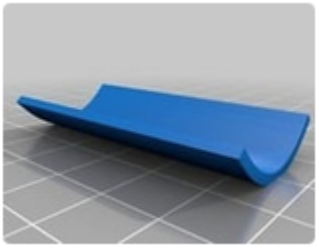
Mike's Math Page

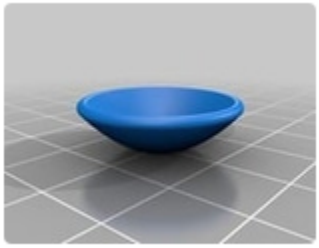


Does $(x+y)^2 = x^2 + y^2$???
On the left **$(x+y)^2 = z$** creates 3D "taco shell" with slope of -1.
On the right **$x^2+y^2 = z$** creates 3D "bowl" of ever increasing circles around the x/y origin.

https://mikesmathpage.wordpress.com/2017/04/06/comparing-x2-y2-and-x-y2-with-3d-printing/

Other samplings of geometric 3D objects in STL file format…



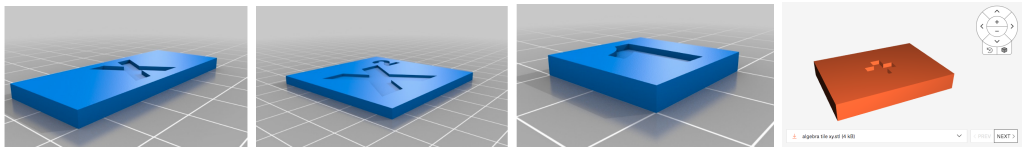


https://www.thingiverse.com/thing:183882

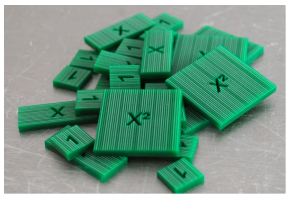
What I did find to be an unintended bonus, that I would have not predicted, was the unique opportunity to capitalize on the "cool" factor of the 3D printer itself. There were several students, who otherwise were completely apathetic, who suddenly got excited about having a 3D printer in the classroom. Not particularly a "math" application, but more of a "building relationship" opportunity, I found it would actually transcend the subject matter and, once that connection with the at risk student was established, they were much more open to doing their math, after that connection was there. This project HAS shown that their interest, excitement, and access they are offered to the latest technology, such as a 3D printer, most definitely HAS made quite of few of these students change their attitude and level of effort into their studies. Hopefully, if this project has ANY effect on these lowest achieving "lost students" it will ALL BE WORTH IT!!

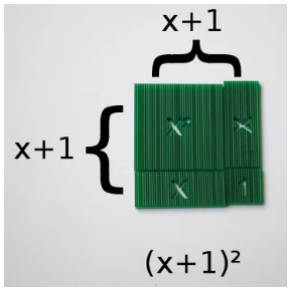
Overall, while it is best suited for corresponding 3D math, ,such as Geometry, it is definitely worth it to have a 3D printer in the classroom, (especially if the cost is covered via an Education Fund Adaptor Grant!).

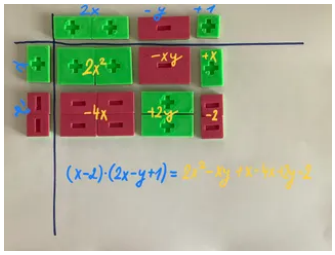
Part 3: Algebra Tiles in the Math Classroom? (Worth it or not?)

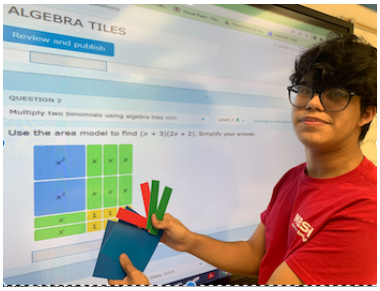


The use of algebra tiles as manipulatives may, (or may not!), be something you find beneficial in your classes. As I am sure you are keenly aware, many students we encounter are at very low levels, some high schoolers with very little understanding and/or ability of even basic math skills. Many of my 9th grade algebra students in particular were already performing way below grade level, even before the pandemic. They unfortunately entered lockdown with only 2nd or 3rd grade math abilities and have had little to no growth since the 6th grade. Algebra tiles, while briefly touched upon in the new math textbooks, is not included at all in the MDCPS pacing guide. Still, there are units in IXL and I found them to be a somewhat useful teaching tool to provide concrete representation even for basic addition and subtraction. Using algebra tiles for multiplying polynomials was somewhat beneficial for a few, but to be perfectly honest, most students found the FOIL method to be quicker and less cumbersome than using physical objects to represent the expressions. Plus, anyone who has had experience with kindergarteners using legos as projectiles or putting them up their nose, will likely have comparable experiences with similarly sized 3D printed algebra tiles in the 9th grade classroom as well!

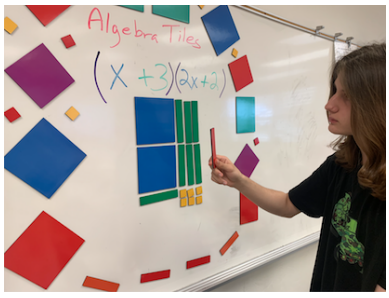


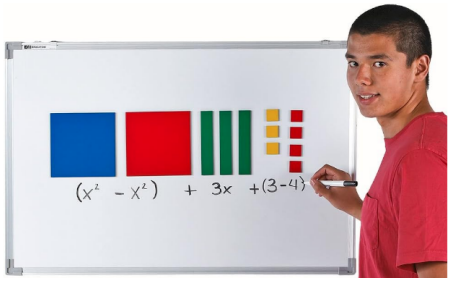






With regard to home made 3D printed tiles, as already mentioned, my initial intent was to print class sets of tiles similar to what you would buy online, but unfortunately ended up being way too time intensive to make a reality. Instead, my suggestion, which I actually DID apply, was to use the “sample magnet set” (right) that I initially included in the budget simply to use as the model to create my own tiles. These oversized and colorful dual sided magnets are actually much more practical than the individual personal 3D

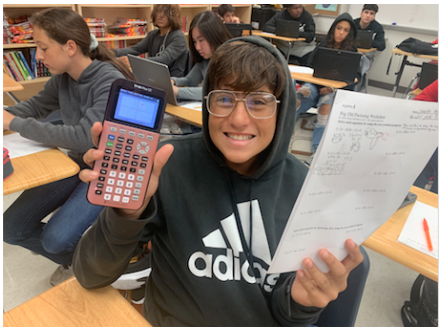


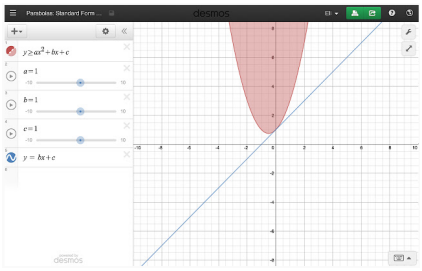


printed tile sets. If you are anticipating applying for the $400 adapter grant, I have included the link at the end of this pack for you to procure this set and have at your disposal as a supplementary resource. It would be interesting to survey MDCPS math teachers (at all levels) to see who, if any, actually use algebra tiles in the classroom and additionally what their overall thoughts are on the method itself.

Part 4: Graphing Calculators in Math Class? (Worth it or not?)

The old faithful TI-84 scientific graphing calculator is what most of us used as math students ourselves 'back in the day'. It is often still used in more advanced math classes by some math educators, but is it still a viable tool for most modern day math students? As part of this grant, the initial budget allocated for four TI-84 Plus calculators to be purchased and utilized in the classroom. As you also probably know, the students have access to the Desmos platform accessed via Schoology. You may also be aware of various free or low cost mobile iOS or Android apps. My personal opinion is that online software and modern apps are much more robust, flexible, easier to operate, and can display the students' work in far greater clarity and detail. Plus, Desmos, and easily downloaded apps, don't cost upwards of $100 per student, but, in fact, these low cost/free resources are not utilized nearly as much as they could be for enhanced learning. Notwithstanding, there is something to be said for the students to be introduced to the hand held, clunky, "old mare", if not only for the discipline required to navigate the various functions, but also as a necessary skill for testing (at least for the foreseeable future.)





Part 5: Superheroes in the Math Classroom? (Worth it or not?)

The title of this Innovator grant is "Mathsters of the Calcu-verse!" with subtitles… "(Implementing 3D Printing, Algebra Tiles, Graphing Calculators, and Superheros in the Math Classroom)" "Relatable cultural references foster student excitement and interest in math." My initial idea was to engage otherwise apathetic students by capitalizing on the superhero craze among teenagers. My intent was to modify parts of the math curriculum (specifically word problems) by slightly altering the situations presented. I implemented this idea by first creating small groups of 3-4 students, with each group responsible for re-imagining two word problems from various chapters. Each group was given the task of replacing the characters presented in the text with the students' favorite superheroes, as well as changing the storyline to make something the character might face when battling evil. Additionally they had to slightly change the actual numbers from the original word problem, but keep the problem's structure and algebra concept intact. For quite a few groups I had to guide them through the process, but once completed, each group would then present their new word problem to the class and then (supposedly) lead the class to solve the new problem together. In actual reality though, what I thought was a brilliant idea was a bit more challenging to make come to fruition. The biggest obstacle was finding ample class time in lieu of the battle against the pacing guide and impending high stakes EOC examination. Several groups were able to complete the task, with limited levels of success, and then eventually, without the luxury of time to continue, I had to keep plugging away at the new material. I also had envisioned using the 3D printer to create small action figures (right) to enhance the presentations, but quickly realized it did not actually add anything to the educational endgame so that idea too was abandoned.

Nevertheless, I still subscribe to the idea that students WILL respond when something relevant to their lives can be tied to their classwork. In order for anything to be meaningful, it must be relevant, and those who are fans of superheroes WILL be more engaged when their favorite characters are inserted into the word problems of the text.

Part 6: Observable Results / Takeaways

The purpose of this project was to try to help you, as fellow math educators, (and me too!) make Algebra (or math in general) relevant, meaningful, understandable, and interesting for otherwise apathetic high school students, especially those in the stigmatized “lowest 25%”. If you are a teacher of Algebra you are painfully aware that our ultimate goal (as reflected in our own IPEGS end of year teacher evaluations) is for our students to achieve success on the FSA EOC assessment, required of all public school students to pass in order to graduate HS in the state of Florida. This project addressed the age-old questions that nearly every teenager asks during math class… “How does this relate to the ‘real’ world?” and “When are we ever going to use this in our daily lives?” By adapting the oftentimes challenging abstract Algebra 1 concepts and applying them to superhero multiverse analogies, the students could visualize concrete examples by creating their own superhero word problems and incorporating the exciting world of 3D printing into the all-to-often “boring” math classroom.

By making math (or specifically Algebra in this case) relevant, concrete, understandable, interesting, and fun, this project has the potential to change the course of many young learners who will no longer be intimidated by math and who will no longer self proclaim, “I am no good in math.” Once someone becomes engaged, and is enjoying learning they can take charge of their own educational development and future, paving the way to success in all their subjects throughout high school and beyond.

While not every idea in the initial project was realized fully, and many aspects did not have the originally intended outcome, nevertheless, the project was more than worthwhile! Not only did the students come away with new skills, appreciation, and greater interest in the subject, I, myself as an educator gained a wealth of knowledge, insight, and wisdom, oftentimes gaining more from what DIDN’T work as expected, than what actually did! I would encourage everyone here today to take advantage of the funds available for the adapter grant to purchase and use the items below. You, too may, (or may not!) have the same results, but that is the nature of the modern day math educator. If you do, please share with us your experiences in these four areas which we have covered today - 3D printing, Algebra Tiles, use of the TI-84, and the introduction of superheroes into your “Mathsters of the Calcu-verse” classroom!!

FYI - for those of you who have students who might be more interested in sports, music or physics, I would encourage you to check out my other two presentations, “Algebrathletics” and “Hooray for Ratios” presented last year of which are still available for adaptor grants on the Education Fund website.

Budget: Materials/Costs

Note: Below are approved and actual $1000 Innovator Grant budget from original project along with scaled down suggested Adapter grant using $400 budget.

Mathsters of the Universe Innovator Grant APPROVED BUDGET TOTAL $997.57

#	Item Description	Vendor	Price	Qty	Total
1	Flashforge Adventurere 3D Printer	Amazon.com	$313.65	1	$313.65
2	PLA 3D Printer Filament Bundle Assorted Colors	Amazon.com	139.99	2	$279.98
3	Texas Instruments TI-84 Plus Graphing Calculator	Amazon.com	94.99	4	$379.96
4	Ti-84 Plus Graphing Calculator For Dummies 2nd Edition	Amazon.com	11.99	1	$11.99
5	Demystifying the Calculator: TI-84 PLUS CE	Amazon.com	11.99	1	$11.99
6	Calculate84 Phone App for Apple & Android	AppleStore.com	0	180	$0.00

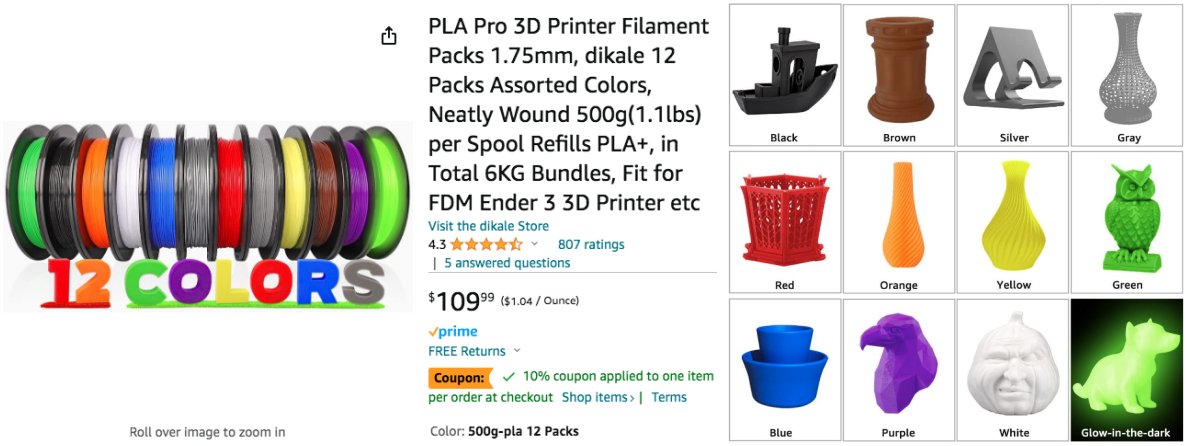
Mathsters of the Universe Innovator Grant ACTUAL EXPENSES TOTAL $1,089.86

#	Item Description	Vendor	Price	Qty	Total + S/H + tax
1	Creality Ender-3 Max NEO 3D Printer	Creality.com	$332.10	1	$369.00
2	PLA 3D Printer Filament Bundle Assorted Colors	Amazon.com	139.99	1	
3	*KINLUOT PLA 3D Printer Filament 2kg Spool*	Amazon.com	29.99	1	$160.48
4	Texas Instruments TI-84 Plus Graphing Calculator	Office Depot	129.99	3	$417.27
5	Ti-84 Plus Graphing Calculator For Dummies 2nd Ed.	Amazon.com	21.17	1	$26.64
6	Demystifying the Calculator: TI-84 PLUS CE	Amazon.com	10.99	1	$11.76
7	Ti 84 Plus Calculator (Quick Study Chart)	Amazon.com	6.95	1	
8	*TI-84 Plus CE Guidebook*	Amazon.com	9.99	1	$18.13
9	*EAI Education Algebra Tiles (SAMPLE SET)*	Amazon.com	42.95	1	$58.95
10	3D Printing for Dummies	Amazon.com	19.29	1	$27.63
11	Desmos.com Online Graphing Calculator	MDPS Schoology	0	126	$0.00

Mathsters of the Universe ADAPTOR Grant SAMPLE $400 BUDGET TOTAL $395.93

#	Item Description	Vendor	Price	Qty	Total
1	Creality Ender-3 3D Printer	Creality.com	$136.00	1	$136.00
2	PLA 3D Printer Filament Bundle Assorted Colors	Amazon.com	109.99	1	$109.99
3	Texas Instruments TI-84 Plus CE Graphing Calculator	Amazon.com	109.99	1	$109.99
4	*EAI Education Algebra Tiles (SAMPLE SET)*	Amazon.com	39.95	1	$39.95
5	Desmos.com Online Graphing Calculator	MDPS Schoology	0	126	$0.00

1. Creality Ender-3 3D Printer
https://store.creality.com/products/ender-3-3d-printer-4za7?spm=..collection_6441e458-3e77-43ed-baf5-2671b3222c52.albums_1.1&spm_prev=..product_37ff6839-f6a2-4af6-af76-21694578662e.header_1.1



2. PLA 3D Printer Filament Bundle Assorted Colors
https://www.amazon.com/Filament-Assorted-Dimensional-Accuracy-Suitable/dp/B07MQS15RZ/ref=sr_1_3?crid=1QP9UH5LQY1Z0&keywords=PLA+FILAMENT+BUNDLE+ASSORTED+COLORS&qid=1698022210&sprefix=pla+filament+bundle+assorted+colors%2Caps%2C98&sr=8-3&ufe=app_do%3Aamzn1.fos.f5122f16-c3e8-4386-bf32-63e904010ad0

Texas Instruments TI-84 Plus CE Color Graphing Calculator, Black 7.5 Inch

Brand: Texas Instruments

4.8 ★★★★★ 42,815 ratings

| 536 answered questions

#1 Best Seller in Graphing Office Calculators

10K+ bought in past month

-27% $109.99

List Price: $150.00

prime Overnight

FREE Returns

Thank you for being a Prime member. Get $150 off:
Pay $0.00 $109.99 upon approval for Prime Visa.

May be available at a lower price from other sellers, potentially without free Prime shipping.

Color: **Black**

3. Texas Instruments TI-84 Plus CE Graphing Calculator
https://www.amazon.com/Texas-Instruments-TI-84-Graphing-Calculator/dp/B00TFYYWQA/ref=sr_1_3?crid=2UP2W9SI7QYLO&keywords=ti-84+plus+ce+graphing+calculator&qid=1698023124&sprefix=ti-84+plus+CE+graphing+calculator%2Caps%2C85&sr=8-3&ufe=app_do%3Aamzn1.fos.f5122f16-c3e8-4386-bf32-63e904010ad0

EAI Education Jumbo Magnetic Algebra Tiles - Set of 35

Visit the EAI Education Store

4.7 ★★★★½ 19 ratings

$39.95

Thank you for being a Prime member. Get a $150 Gift Card: Pay $0.00 upon approval for Prime Visa.

- This set of jumbo algebra tile is made of durable QuietShape foam, which encases strong magnets.
- The jumbo flat measures 6 1/2" square, making it easy for the whole class to see, whether students are working in small groups or if the instructor is demonstrating up on a white board.
- Each piece is double-sided, allowing any piece to by positive or negative.
- Set of 35 double-sided tiles.
- Recommended Grade(s): 6+

4. *EAI Education Algebra Tiles (SAMPLE SET)*
https://www.amazon.com/EAI-Education-Magnetic-QuietShape-Algebra/dp/B01GKHG794/ref=sr_1_15?crid=2DCJM5SMQGAN2&keywords=algebra+tiles+magnetic+teacher+set&qid=1698022694&sprefix=ALGEBRA+TILES+MAGNET%2Caps%2C114&sr=8-15