OCTOBER 2023

VOLUME 2

NOYCE NEWS

UCF - OCPS - CITY YEAR

KNIGHT SPOTLIGHT

This fall, **Nisha Phillip-Malahoo, Shane Wiggan,** and **Abigail Ruiz** all sat down to chat with Dr. Childs on "Inspiring Voices from the Classroom". These chats highlight innovative teaching practices and feature exceptional teachers. These fellows shared about incorporating virtual reality in mathematics, making mathematics relevant and the importance of engaging all students by authentically knowing who they are.

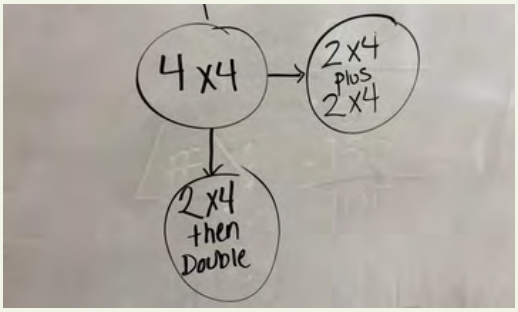
Celebrating Success!

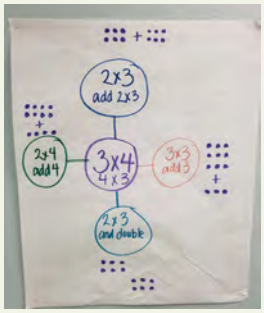
All fellows have received IRB approval for their research and will be starting data collection. Also, congratulations to the following fellow who was awarded Foundation for OCPS grants: **Nisha Phillip-Malahoo** was awarded the Walt Disney Gardening and Horticulture grant for $500. Exciting news coming soon about three fellows' Duke Energy grant applications!

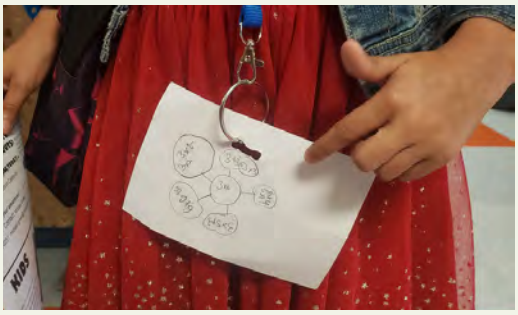
FCTM CHAT

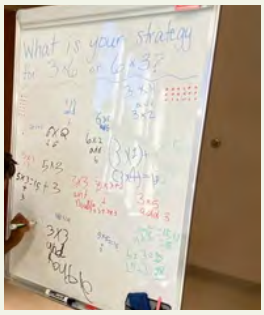
Noyce Fellow **Abigail Ruiz** will be moderating a Florida Council of Teachers of Mathematics chat on the platform, X. Join the chat November 9th, 8pm EST to learn about *The Important Intersection of Contextual Relevance and Cognitive Demand*. Join her for an exciting conversation about how CRCD instruction can transform the way we teach mathematics and help students see the joy, wonder, and beauty of mathematics as they strive for excellence!

This work was supported by the NSF grant #2050606. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.







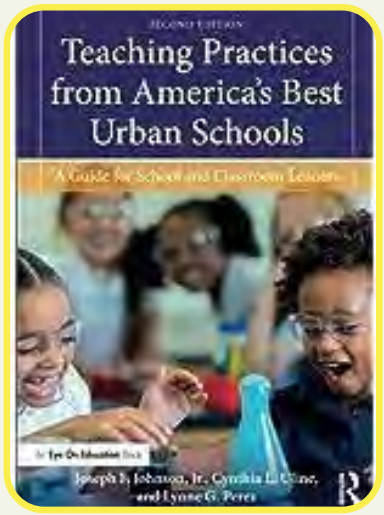


OCPS and UCF has partnered together to help build teacher and student multiplicative reasoning and relational thinking through the *FactTactics Fluency* program. To the left are some pictures of this program in action at the Noyce Fellows' schools.

What are your students' favorite tactical strategies for their multiplication facts?

AFFIRMING LEARNING WALKS

Affirming Learning Walks are focused on the eight effective teaching practices from Johnson's 2019 work. Fellows **Kayla Blankenship** and **Deborah Blakeslee** started the walks this month with **Dr. Brooks**. When asked about participating in affirming learning walks, teachers responded positively about the experience. The following are quotes from some of the teachers.



- "It was refreshing to hear positive feedback for myself as the teache and for my students. It made me proud to hear about the student conversations happening that I don't normally get to hear while I a working in small groups."
- "This process was amazing for all teachers. The positivity that is shar after being observed is welcomed. It was a great experience!"
- "It was very reassuring to know the walks were focused on only the good things that are happening in the classroom. Getting the positive feedback afterward gave me a new outlook on my lesson, which I typically don't see. I felt so proud of my class that I had to share some of the great things with them!"

UCF CCIE HIGHLIGHT

Diane Dellibovi, Lori Hart, Sarah Lumpkin, Maria Porras, and **Joslyn Vilabrera** were interviewed by the CCIE Communications team to share their academic journey from the Lockheed Martin Academy to Noyce, the impact the programs had on their teaching, and their greatest accomplishments.

HTTPS://CCIE.UCF.EDU/NOYCE-MATHEMATICS-EDUCATION/

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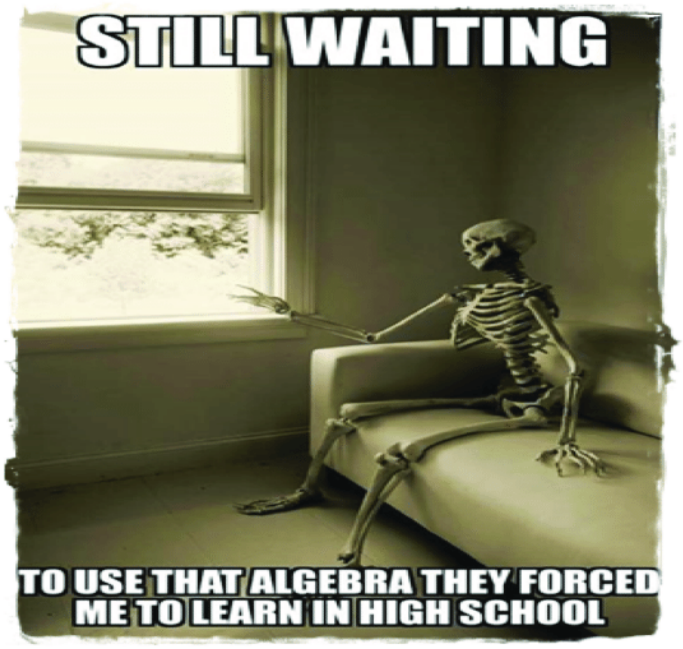
Gateway to Meaning

by Dr. Brian E. Moore, Department of Mathematics, UCF



Interestingly enough, some of the reasons to learn algebra are the same reasons that people find humor or some connection with this meme†. It isn't real, but it has meaning. No one has ever discovered a person sitting upright on a couch, yet fully decomposed, making comments about the uselessness of their education. Nor does the content people learn in high school become useful, whether suddenly or by some process, while they simply sit and wait for excessively long periods of time. Lately, most of us are probably seeing more skeletons than usual, but the only thing they are waiting for is trick-or-treaters. It isn't real, but the image and the idea carry meaning, which connects with our lived experience and gives us a way to communicate that experience with others.

This is one major reason to learn mathematics. Of course it isn't real. The symbols and rules of algebra are synonymous with abstraction and otherworldliness. However, it does carry meaning which connects with our lived experience, and it gives us a standard for communicating those experiences to others.

For the skeleton sitting on the couch, I must argue that algebra is quite useful, even in common and simple cases when arithmetic problems arise, such as "What is half of 573?" or, "What is 3% of 409?" Many times these problems arise from some real-world application through the course of typical conversation, and an excellent way to do problems like that is to use algebra. Notice, half of 573 is

$$0.5\cdot 573 = 0.5\cdot(500+70+3)$$
$$= 250+35+1.5$$
$$= 286.5.$$

Similarly, 1% of 409 is 4.09, so 3% of 409 is

$$3\cdot 4.09 = 3\cdot(4+0.09)$$
$$= 12+0.27$$
$$= 12.27.$$

Both computations can be broken down into a few simple arithmetic operations with a good understanding of algebra.

After twenty years of teaching mathematics to college students, I imagine the come back from the skeleton to be something along the lines of "I'll just ask my phone what 3% of 409 is." My reply: "Good point." Generally, that is an absolutely acceptable method for solving the problem, and it does not require any knowledge about algebra. Following that line of thought, it may be reasonable to conclude that the high school graduate, who does not go on to do more mathematics, for whatever reason, can live a full and (dare I say) meaningful life without ever directly using any algebra. As technology

†A. Andersson and D. Wagner, Remythologizing Mystery in Mathematics: Teaching for Open Landscapes versus Concealment, *Education Science* 2018, 8(2), 41; https://doi.org/10.3390/educsci8020041

continues to evolve, this case against learning algebra may seem to become only more convincing, because computers can do algebra with more ease and precision than most of us.

Still, no other class in high school teaches abstraction, grounded on a bedrock of unambiguous and unmistakable legitimacy, quite as well as algebra. In fact, pre-algebra and algebra may be the best training in logical thinking that students can get, and that is something everyone needs. In her book, *The Art of Logic: How to Make Sense in a World that Doesn't*, Eugenia Cheng says, "…nothing in the real world actually behaves according to logic. So in order to study anything using the rules of logic we have to perform some abstraction, that is, ignore some of the details of the situation so that we move to the abstract world of ideas, where things do work according to logic." That is essentially what happens every time students solve word problems or every time mathematics has some real world usefulness. Taking a concrete situation and performing some abstraction enriches the meaning in ways that empower us to make logical connections and valid deductions. Consider the following story.

This week, when I asked my son what he is learning in his Algebra I class, he described the process of cross-multiplying as he struggled to remember the word "proportions." I was so excited; we spent the next 20 minutes talking about ways that the abstract notion of proportions is useful. I reminded him of our neighbor, who had to cut down a tree, knowing it would just barely fall short of hitting his house, because he used proportions to estimate the height of the tree. Then, we reminisced about a time when we got a map of a city at the tourist information center that was not to scale, and how we were so confused, because the real distances we walked were in no way proportional to the distances on the map. We also talked about his remote control car which has 1:20 scale, and how proportions could be used to calculate the size of the parts on the actual automobile. This talk about cars led us to memories of road trips we had taken, where needing one day to go 500 miles meant we would need 4 days to go 2000 miles, and where paying only ten cents per gallon extra at the pump makes a real difference when you put in 20 gallons per day four days in a row. The usefulness of that algebraic concept seems endless, with daily applications to cooking, budgets, investments, time management, building projects, and so much more. I may have started to lose my son's attention when I started talking about proportions in the laws of physics, but it's okay, we have to draw the line somewhere.

In the end, every instance of proportion that we had discussed required ignoring some of the details, in order to focus on some important aspects and obtain useful information. Every instance required employing some abstraction (that of proportion), which enriched the meaning and made room for the rules of algebra to reveal a bit of their power. In every instance, an algebraic concept connected with our lived experience and gave us ways to communicate it with others. Essentially, it was because my neighbor used his high school algebra that I learned a few (very useful) things about cutting down trees, and I'll keep it tucked away, in case I ever need it.

Making my point through an example about proportions is weak compared to the strength of algebra itself. Indeed, proportion is only the concept my son just happens to be learning at the moment, and there are so many more. To me, it seems likely that the skeleton on the couch actually did use algebra at many points in life without realizing it. Too bad so many other opportunities for enriched meaning passed by unnoticed. I guess it's too late for him now, but it's not too late for the living. If you are, or have been, or will be, a student of algebra, I assure you, it may be one of the most useful subjects you learn, regardless of your career choices, but if you sit and wait for it to become useful, you may die disappointed.