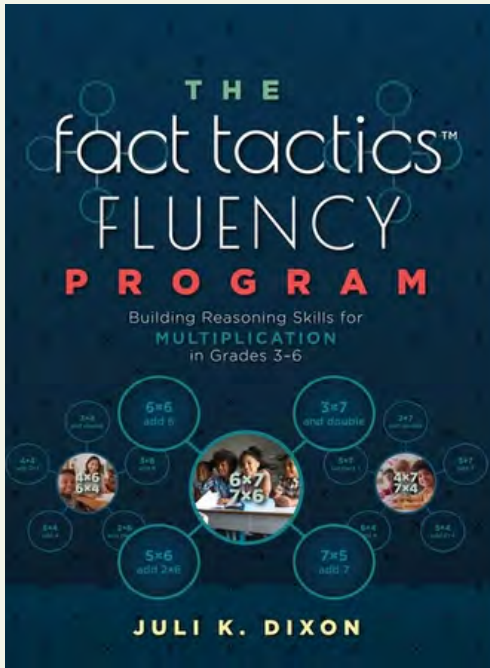




NOYCE NEWS

UCF - OCPS - CITY YEAR



THE FACT TACTICS FLUENCY PROGRAM

Fellows **Laura Pimentel** and **Kayla Blankenship** have teamed up with Orange County Public Schools to lead the implementation of a pilot of Dr. Juli K. Dixon's *Fact Tactics Fluency Program*. Several schools within the district are participating in this pilot as they work to help students build their multiplicative reasoning skills through this program. The 20-week program is approximately halfway complete, and Kayla and Laura have each successfully led a professional development session for participating schools. There are additional sessions on the horizon in January and February.

COLLABORATION WITH CITY YEAR



Fellows continue to work with and mentor City Year corp members. Fellows **Julia Keith**, **Kelly Penny**, and **Yeidi Diaz Reyes** provided a virtual professional development session entitled *Shifting the Mindsets of Our Mathematical Learners*.



Fellows **Abi Ruiz**, **Laura Pimentel**, and **Kayla Blankenship** presented to corp members at Memorial Middle School and Catalina Elementary School about strategies for engaging students and leading them to love learning.

[HTTPS://CCIE.UCF.EDU/NOYCE-MATHEMATICS-EDUCATION/](https://ccie.ucf.edu/noyce-mathematics-education/)

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UPCOMING PRESENTATIONS

Several fellows are presenting at conferences on a variety of topics in the coming months. Speaking at conferences provides a platform for fellows to share their findings, engage in intellectual discussions, and receive constructive feedback. Conference presentations also enhance the visibility of the fellows, allowing them to establish professional networks, gain recognition, and pave the way for future opportunities.

AACTE & ICRSME CONFERENCES

Fellow **Nisha Phillip Malahoo** is presenting at two upcoming conferences. In February, Nisha will present at the Holmes pre-conference for the American Association of Colleges for Teacher Education's 76th Annual Meeting. She will also deliver a presentation at the 2024 International Conference on Research in Science and Mathematics Education Virtual Conference in April.



NCTM 2024 VIRTUAL CONFERENCE

Fellow **Kayla Blankenship** will be a speaker at the National Council of Teachers of Mathematics 2024 Virtual Conference in April. She is delivering a presentation entitled *Math Club Magic: Nurturing Elementary Students' Positive Mathematics Identities*.



NCTM 2024 REGIONAL CONFERENCE

Fellows **Abi Ruiz** and **Diane DelliBovi** will be presenting at the National Council of Teachers of Mathematics 2024 Regional Conference in Seattle this February.

Their presentation is entitled *Let's Talk Tasks: The Important Intersection of Contextual Relevance and Cognitive Demand*.



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Gateway to Revelation

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

My wife and her friend were on their way to the local hardware store. Because of the situation they had just left behind, my wife was uncharacteristically speechless. Her friend exclaimed, "What I don't understand is that he has a PhD — *in mathematics!!*" She was, in her way, gently communicating the sentiment, "I thought he was smart, but it's a wonder that he can even feed himself." Ten minutes earlier they had discovered me and my dad happily working with unwrapped Tootsie Rolls crammed into our ears. (If you need to read that sentence again, just to make sure you got it right, take your time.) I wish I could claim that I had sound reason for doing it, such as I was obeying the fifth commandment, or research suggests it is a cure for the hick-ups, but, alas, it was just poor judgement.

My dad was helping me refinish the hardwood floors in our house. We had two large electric sanders running, along with a few box fans, and the noise was deafening. We paused and agreed on the need for ear protection. Unfortunately, we had just returned from our eleventh trip to the hardware store that day and completely neglected this detail. My first thought was, "Really? We need to go back and make it a dozen?" But my dad, forever on a path to his next root canal, pulled a hand-full of the chocolaty, gummy, candies out of his pocket and said, "These are like earplugs." I froze. Then I shrugged, as if to say, "There's no evidence suggesting the existence of any ear protection that is superior to Tootsie Rolls. Besides, I don't see any other options."

No doubt, my critical thinking skills were lacking that day. At no point did I consider the possibility of a perforated eardrum, or that my wife would be happy to make a run to the hardware store on my behalf. I cannot claim even the slightest display of logical thinking. The statement: "*If I smash Tootsie Rolls into my ear canal, then my ears will have good health and longevity,*" is not logically sound. In the moment, I may have believed I had good reason, but I have yet to tell that story to anyone who agrees that it was the least bit reasonable. I wish I could deny the validity of the story, as it is not comfortable for me to share, and I would prefer to keep it hidden.

Even so, it brings us to our main point. In an article published in PLoS (Public Library of Science) One in 2020, the authors Cresswell and Speelman explore the idea that higher levels of mathematical training lead to better critical thinking, logical thinking, and reasoning. Their study was conducted at a university with students and faculty having various levels of mathematical training. First, those with minimal training had completed only the first required math class and no more. Next was the group who completed up to Calculus I, followed by those who completed about four math courses beyond Calculus I. Finally, those who completed the courses required for a math major were in the fourth group. They were given numerous tasks, which did not directly require any mathematics but provided a measure of their skills in critical thinking, logical thinking, and reasoning.

Their findings indicate a direct correlation between improvements in these thinking skills and higher levels of mathematical training. Those with the minimal training exhibited (on average) minimal skills in critical thinking, logical thinking, and reasoning. As the mathematical training increased so did the thinking skills, and the math majors exhibited the highest levels of critical thinking, logical thinking, and reasoning. Though there are still many unanswered questions surrounding this idea, and one should read the article

to get the details, the science suggests that better critical thinking, logical thinking, and reasoning are byproducts of mathematical training.

Now, let me leave what the sciences says, and share my own conclusions. Just as people do not become physically fit without training, people also do not become rationally fit without training. Logical thinking must be learned and practiced, and no one does it well without first developing the skill. The same is true of critical thinking and reasoning. Justification for this is tucked away in how we communicate with each other and how society functions. The events and encounters we experience throughout the course of a day do not generally follow the rules (of logic), and, to be honest, daily life would become tedious and pedantic if those rules were consistently followed. As a result, our thought processes will, quite naturally, tend away from those rules, unless we intentionally train.

The article from 2020 exhibits evidence that clarity of thought is one of the myriad of offerings available to a thinker through mathematical training. I believe this is true. My decision in favor of unconventional ear plugs may seem completely contrary to that idea, but I hope that it actually helps make the point. Clearly, the highest levels of mathematical training attainable do not guarantee a life of flawless decision-making. After all, mathematical training does not make one less human (though many have wondered), and one instance where a mathematician acted with poor reasoning, indeed, does not imply that mathematical training does not improve reasoning skills.

So, the story does not refute the point, but how does it actually help make the point? Good mathematical training teaches us not to hide things, even when they seem contradictory to our intent. A key to mathematical dexterity is getting all the known information out into the open, regardless of how uncomfortable it is, so that clear and simple solutions to problems can be found and understanding can be as complete as possible. I imagine this is different from the training that a sales person or politician or influencer might receive, as it seems common practice to intentionally hide some things in order to make the sale or get the vote or gain popularity. But, if our aim is truly to be logical, critical thinkers, capable of sound reason, then we must be willing to face the truths and perspectives that are uncomfortable or undesirable, simply because they are truths and perspectives.

This is near to the heart of Noyce at UCF. Through their dissertations, the Noyce Fellows are working to reveal truths about mathematics education, including those that may be uncomfortable, in order to find good solutions. As mathematics teachers and leaders, they are preparing their students to courageously step into the uncomfortable for the sake of truth, in order to inspire the next generation to solve the problems that we did not. Perhaps if one of them had been there the day I was running that sander, reminding me to think more like a mathematician and less like a son who can't be bothered, or encouraging me to uncover more of the relevant information, then it would have been difficult to conclude that Tootsie Rolls were the best solution.

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