



Gitanjali Rao loves the news. In the evenings, she enjoys learning about new advances in the scientific communities around the world. They give her inspiration - and plants seeds for her ideas. Gitanjali has a knack for developing inventions of one kind or another. “Many of my inventions have been inspired by just watching the news.”

Over time, she noticed disheartening stories running each day on climate change. She started thinking deeply about all the different crises that her country was facing. Thanks to her good education in STEM – Science, Technology, Engineering and Math - she had a strong scientific base. She wondered what could she do - with her affinity for tinkering, and the joy she gets from problem solving -- to help people who are suffering.

Gitanjali's first venture was a response to the public health water crisis in Flint, Michigan. “When I saw the TV broadcast from Flint, I was appalled. I couldn't believe how many kids my age were drinking lead poison everyday. And this causes lifelong health problems. It was just so unfair. And no one was doing anything about it.” The inadequate re-routing of the public water system resulted in highly toxic levels of lead in the water supply. Hundreds of thousands of people in the region were being affected since 2015. “The worst part is that by the time people realize a problem like this, one that oftentimes can't be physically seen, it's almost too late. They already have consumed it, and will suffer the negative effects for the rest of their lives.”

At age 13, Gitanjali created Tethys to detect lead contamination in drinking water sources. With this invention, people can assess -- in real time -- if their drinking water has safe levels or not. The implications for places like Flint are enormous. Gitanjali's Tethys gained the attention of many national outlets - including by 3M, which awarded her a \$25,000 prize for winning their Young Scientist Challenge in 2017. Now she is looking to partner with an incubator to raise funds and expand the reach and breadth of chemicals she can test for. “Finding partners to expand this idea is going to help me evolve into being an entrepreneur, not just an inventor. As an entrepreneur, hopefully I can reach a lot more people.”

Another national health crisis Gitanjali learned a lot about on the news was the opioid epidemic. Over the last decade, the opioid crisis has wreaked havoc on communities in the United States. Since 2016, roughly 45,000 people a year have been killed by opioids, mainly by overdose -- and what's especially tragic is that roughly 2,100 of these overdoses a year occur in youth ages 15-24. Aside from overdoses, there are many negative health-related consequences from the misuse of opioids. Prescription opioids -- from sports injuries - make up the majority of health emergencies nationally. The Centers for Disease Control and Prevention estimate that for every overdose a youth has related to opioids, there are 119 emergency room visits and 22 treatment admissions. In October of 2017, the opioid epidemic became so impactful, that it was declared a public health emergency.

Gitanjali knew she wanted to do something about the opioid epidemic, even though it on the opposite side of the scientific spectrum from her first invention. “I knew it wouldn't be easy. But I like to solve problems affecting those in my age group. I can relate more closely to problems that way.” And so she began working out a biological solution to help with the prescription opioid addiction impacting youth everywhere. And so she created Epione.

Epione is an app connected to a testing device, that detects how addicted someone is or isn't to opioids. The test detects the protein produced by a specific gene when it comes into contact with prescription opioids. So the higher the protein level, the higher the indication is for opiates. "It's sort of like a litmus test for ph. An easy to read color strip shows on app, and you can see where a person is on the spectrum of addiction. The app also has corresponding maps to local counselors, physicians, doctors, and others where youth can get help." For this invention, she won the TCS Ignite Innovation Student Challenge.

Gitanjali saw horrified to see how many young people her age were struggling with was bullying. Bullying -- physical, verbal, and social. Direct, or passive. In person and online. As a technically minded student, she began focusing on a way to help prevent a modern form of bullying that has been on the rise in recent years - cyberbullying.

It's estimated that around 5 million students a year are bullied, either in person or online. This has serious mental health consequences for both the bully and the victim. From higher rates of anxiety, suicide, depression, substance use, as well as declining academic achievement. According to the HHS, over 60 percent of youth who experience cyberbullying are significantly challenged to learn and feel safe at school.

To help combat this epidemic, Gitanjali designed the app Kindly. Kindly is an extension that can be added on to web browsers, social media sites, and other mobile and desktop applications, that helps parents, educators, and students alike detect potential bullying incidents - and stop them before they happen. It highlights text that may be problematic, and blocks it, or allows it to be sent with adjustments, depending on the severity of the language. In the near future, Gitanjali hopes schools will adopt her app, and act as the first line of defense for protecting victims of bullying.

For the youth who want to explore a similar path to Gitanjali, she has a few words of wisdom surrounding fun, community, togetherness, and the hands on nature of a practical STEM education. "Whatever you are trying to learn, have fun with it. Create communities to support your ideas. Learning happens most productively when people can learn together. Don't be afraid to make it hands on. Lectures have their place. But hands on learning skills with real world experts is the quickest way to becoming proficient. This sort of STEM training needs to be in all of our classrooms."

Gitanjali believes that the support of adults is critical for those youths pursuing their educational goals. "If we're talking about parents, support whatever your child wants to learn. If you are a teacher, do the same for your students. We've all got a dream in mind, and it's hard to follow that dream when you don't have support. I couldn't imagine approaching such complex problems without that support structure."

Gitanjali also recommends that parents learn with their kids, and even try to learn new things themselves as inspiration. What's the same, is her advice to adults who approach learning themselves, "Have fun with it. There's never a limit to fun. I like to say, *Go after it like a teenager!*"

As a youth leader in STEM, who is vocal about advancing female involvement and leadership in tech, Gitanjali has a message to women and girls. "I had a mentor say to me, 'don't go into it thinking you're a girl or woman in tech'. You are going after big ideas. You are solving incredibly complicated problems. You are creating and inventing things. No matter who you are, these things are commendable. So don't qualify what you are and aren't. Just break the stereotypes that exist by being the best you can be. And do it while you are doing what you love, and what you want to do. Don't ever stop doing that."

Gitanjali's work has shown that traditional ideas of what STEM is and isn't, are outdated. Knowledge in STEM can lead to incredible advancements in a society, beyond our institutions. Tethys, Epione, and Kindly, are inventions in what are seemingly three very different spaces. But in reality, each of these technical creations play an important role in alleviating a specific contemporary public health issue that is harming people on a day to day basis. It's time to think of a STEM education as being a pathway to healing our communities. And with youth leaders like Gitanjali showing us the way - intellectually and socially - the possibility of having a bright, healthy, and sustainable future is certainly in reach.

If you can do it, do it. If you can achieve it, achieve it.

Bessie Blount Griffin, Inventor

Call To Action: Explore STEM learning and project-based opportunities. Invent something to help humanity. Gitanjali has partnered with UNICEF Voices of Youth to educate others on the importance of cyber-safety. Check out her blog entry <https://www.voicesofyouth.org/campaign/your-world-reimagined>"

Stone Soup Leadership Institute
www.stonesoupleadership.org
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