Community Spotlight

Each Community Spotlight features an outstanding group, partner, resource, or member of our community.

Anne Rosenwald, PhD, Georgetown University

Anne Rosenwald has been involved in bioinformatics and genomics CUREs (Course-based Undergraduate Research Experiences) since 2004, first with the Genome Consortium for Active Teaching initially developed by Malcolm Campbell and colleagues, and more recently with the Genomics Education Partnership, the Genomics Education Alliance, and the Network for Integrating Bioinformatics into Life Sciences Education (NIBLSE).

Anne is also the founder of a project for comparative bacterial genomics called Genome Solver. Genome Solver began in 2011 as a way to teach faculty basic “plug-n-play” bioinformatics. With funding from the National Science Foundation, the Genome Solver team first partnered with the J. Craig Venter Institute to deliver workshops to faculty at their locations in Rockville, MD and La Jolla, CA. A shorter version of the workshop was then developed and taken on the road to nearly 20 colleges and universities.

Now, the workshops are online through QUBES, where all of the Genome Solver materials are currently available--bioinformatics lessons, exercises, and the Community Science Project looking at horizontal gene transfer between bacteriophages and bacteria. Anne continues to work with two former postdocs on the project, Gaurav Arora at Gallaudet University and Vinayak Mathur at Cabrini University (pictured with Anne above, respectively).

How and why did you get involved with STEM education reform?

My PhD is in Biochemistry. Bioinformatics wasn’t part of my program back in the mid-80s, but through the 90s and 00s, I got more and more interested in the idea that you can learn a lot of biology if you know something about computers and can analyze sequence data, so I started teaching myself about bioinformatics through online classes and poking around on websites.

It became obvious to me that one great application of the things I was learning was to embed them in the classroom. Using bioinformatics and genome sequencing data is a great way to get students involved in research because

the bar for entry is low--all you need is a computer and an internet connection, and there's so much you can do and explore with simple plug-n-play tools.

Over the years, I have been fortunate to be able to work with a lot of people on different projects that had the same overall goal of incorporating this kind of learning into the classroom.

What change are you working towards in STEM education, and how do you enact that change?

Part of my teaching philosophy is to help students acquire the skills to be able to really see what research in science is all about. Research in science isn't about going to the library or memorizing textbooks. Science is doing, and students learn science by doing science.

I think, as a community, science educators have done a good job of incorporating active learning, even in lectures--using case studies, doing think-pair-share exercises, etcetera--but where I think we could do a better job is incorporating authentic research into the classroom. So I've been trying to push the idea of course-based undergraduate research for a while.

As I mentioned before, using just a computer, students can take raw genomics data and try to interpret it, and they probably have some hypothesis in mind that they're trying to test by looking at the data. Even if they're not collecting their own data, there's tons of sequence data out there already, and the information that's contained in a given dataset hasn't necessarily been exhausted by whoever collected it. So that's why it's interesting to do this kind of work because you don't really need a lot of equipment other than the internet, and you have access to tons of data to look at already.

Outside the classroom, one of the advantages of working with different groups from around the country is to see how change is being enacted in different places. Being able to bring these ideas back to my home institution to think about how we might institute change in our culture is really rewarding, but a long, slow process.

What keeps you motivated?

Knowing that there are lots and lots of others out there who are also working towards the same goal - getting students the best possible education in STEM.

How has the QUBES and BioQUEST community helped you achieve your goals?

QUBES has been great! We had initially built our own Genome Solver website, and it was really difficult to maintain and didn't have a lot of the functionalities we wanted. Moving the website to QUBES made a huge change for the better. Not only do we have much better functionality, but we also have access to lots of expertise that we didn't have before.

Moreover, the QUBES/BioQUEST community has been really warm and welcoming. I've made lots of new connections to people doing lots of different things. The BIOME meeting this past summer was especially great for building a group of people interested in implementing RNA-Seq in their classrooms through the Genomics Education Alliance. All in all, our interactions with QUBES have been very positive.

What advice would you give someone interested in getting more involved in STEM ed reform?

Be aware that it takes time and energy to change from lecturing to doing hands-on work with your students and that you really have to plan ahead; you can't do it very effectively in the middle of a semester.

Are there teaching resources you'd like to point our community to?

Genome Solver Resources - bioinformatics lessons, exercises, and the Community Science Project looking at horizontal gene transfer between bacteriophages and bacteria.

Genome Education Alliance Lessons - curated resources and workflows to ensure the sustainability of undergraduate education in bioinformatics and genomics.

Genomic Education Partnership - a nationwide collaboration of more than 150 institutions that integrates active learning into the undergraduate curriculum through CUREs centered in bioinformatics and genomics.

NIBLSE Learning Resource Collection - high quality bioinformatics learning resources appropriate for undergraduate life science courses.

How can our community get involved with your projects?

Learn more about one of the groups above or contact me at Anne "dot" Rosenwald "at" georgetown "dot" edu.