FUTURELAB+

MASTERCLASS SERIES

Educator Guide

Pedagogical Framing and Educational Practices

A How-To Guide to Facilitating Instruction

Developed in partnership with:

Discovery Education

MASTERCLASS SERIES

Masterclass Video Educator Guide

OVERVIEW

Futurelab+, a Genentech science education program, equitably empowers tomorrow's biotech breakthroughs. This program has been designed with a culturally competent lens to guide educators on their journey towards meeting students' learning needs and inspiring the next generation of diverse science and health professionals. The Futurelab+ curriculum embeds career exploration and industry engagement while creating a community of practice for science educators. All instructional materials are designed to meet national education and industry standards to focus on in-demand skills needed across the full biotech product development lifecycle, from molecule to medicine. This exposes students and educators to the breadth of education and career pathways across the biotechnology industry.

Through this collection, educators are equipped with strategies to engage students from diverse racial, ethnic, and cultural groups providing them with quality, equitable, and liberating educational experiences that validate and affirm student identity. Units are designed to be problem based and focus on workforce skill development to empower students with the knowledge and tools to be the change in reducing health disparities in communities.

This Masterclass series allows educators to take a deeper look at the pedagogical framing and educational practices needed to facilitate instruction, at this level. This master class will introduce you to three impactful educators that are teaching in diverse urban school districts. Immerse yourself in the world of remarkable individuals that are making an impact within their community and inspiring the workforce of tomorrow. Reflect on your practice, consider barriers, and how to incorporate these approaches. Teaching is a journey and it is better traveled with other passionate professionals to guide you along the way.

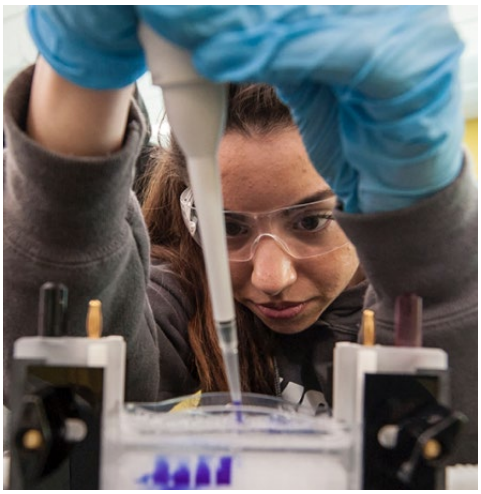
OBJECTIVES

Explain why it is valuable to engage students from diverse racial, ethnic, and cultural groups with quality, equitable, and liberating educational experiences that validate and affirm student identity.

Illustrate how educators use Futurelab+ resources to empower their students to become change agents in their community.

Equip educators with knowledge and tools to have necessary conversations in the high school science classroom.

Connect educators to the product development lifecycle and the breadth of career pathways across biotechnology.



A Closer Look

In this Futurelab+ Masterclass series, you will meet three teachers from across the United States that have put these practices into action. There are two themes that you will analyze, as you consider how to incorporate these ideas into your teaching practice.

Theme 1
Students can be empowered to solve community and global problems.

Theme 2
Pedagogical framework is vital to creating a STEM workforce, allowing students to see their entry point into the field of biotechnology, and become the solution seekers of tomorrow.

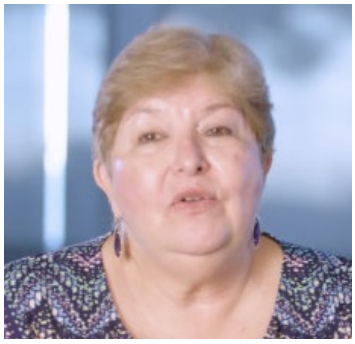
Featured Educators

1 **Sam Long (he/him),** high school science teacher, St. Vrain Valley Schools, Denver, Colorado

Sam Long is the recipient of the 2020 Teaching Tolerance Award for Excellence in Teaching and the 2021 National Education Association Virginia Uribe Memorial Award winner for Creative Leadership in Human Rights. He is the co-founder of the Colorado Transgender Educators Network and Nonbinary Educators Network. Sam is a first-generation Chinese-American-Canadian, third-generation scientist, and a first-generation transgender man. He is an advocate for more gender-inclusive biology curriculum for the future.

2 **Pedro Delgado (he/him)**, computer science and science teacher, Young Womens' STEAM and Preparatory Academy, El Paso, Texas

Originally from the borderland, Pete was an English language learner who majored in neuroscience and moved into a career in education. Pete has only taught in Title I schools, minutes from the Juarez, Mexico/El Paso, Texas border. Many of his students will be the first in their families to graduate high school and/or college. Students from low socioeconomic backgrounds learn alongside their peers that have some of the highest socioeconomic backgrounds in the borderland. He teaches Science and Computer Science to high school students. His campus specifically focuses on project-based learning to ensure relevancy and engagement for all students.



3 **Guadalupe Tapia (she/her)**, Biotechnology, Maxine Silva Health Magnet School, El Paso, Texas

Originally from Mexico, Guadalupe received her degree from the University of Texas at El Paso. She worked in the lab prior to deciding to become an educator. Guadalupe has taught Biotechnology for 11 years and is currently working on a biotech pilot with UCLA (with students from California and the borderland). Her campus provides medical/ biotech career pathways for borderland students who would not have an entry point without the specific courses offered. Many of the students that graduate from Silva will go on to attend the local medical dental or nursing school. This campus is helping to shift health disparities in the region by educating students who will remain in their community and make a local impact.

Theme 1

Empowering Students

REAL-WORLD CONNECTION—FUTURELAB+ ACTION

The goal of this section is to help you connect with educators and consider how to empower your students to seek solutions to community problems, improve health literacy and address social justice issues and/or health disparities.

1 *How to Empower Students to Handle Inequities:* The U.S. healthcare system has many glaring inequities when it comes to the care patients receive. How can science teachers not only introduce and study these inequities with their students, but also empower them to find solutions to the disparities they see in their own communities? By challenging students to break down these issues and find solutions, science teachers have the opportunity to ensure that the next generation of students can help reduce inequities that currently exist. Even in a biotech classroom, students must develop the scientific, social, and personal skills they'll need to help improve their social and political participation. Sam Long suggests that before you begin the process of discussing inequities with your students, you should begin by getting to know your students and offering opportunities to make personal connections with them. This allows you to take those personal connections and ensure curriculum topics are relevant and engaging for all students. We want students to become adults with strong research skills, bias detection, evidence-based conclusions, and the ability to understand various sources of information. Sam believes that it is important for students to see these are not only important skills for activists but, for anyone who lives in this world and has a stake in the future. Students should know that there are several entry points to addressing inequities in their community. The goal is to help students to discover what they are passionate about, and help them find their method of communicating.

"We're preparing students to make decisions and to make sense of the real world in the science classroom."

2 *Project-Based Learning:* PBL, or Project-Based Learning, is a student-centered approach that challenges students to solve real-world problems. Pedro Delgado uses PBL to empower his students to solve community problems by connecting curriculum to their local community. In his classroom students explore and self-direct their learning, within the PBL framework, to solve complex problems that exist within their own school, family, or community. PBL is vital to the science or biotech classroom because students are focused on an authentic task that has a lasting impact. Students take on roles and have specific goals throughout their project. When using this type of approach, students are engaged and collaborate on meaningful projects. PBL promotes 21st-century skills: critical thinking, collaboration, creativity, and

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Theme 1

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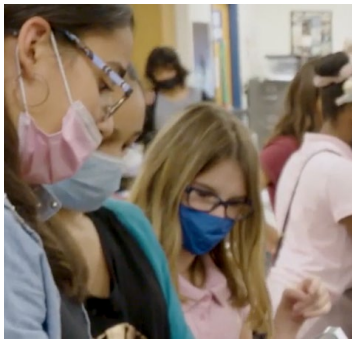
Empowering Students



communication. These skills allow students to navigate success through challenges in and out of the classroom, preparing them for their future careers. Pedro believes that the biggest benefit to PBL is that students see themselves as solution seekers. They begin to see the world through a new lens and look for solutions, rather than just accepting the problems that exist in their school, family, and community. If we prepare students to solve the world's problems, they will.

"Project-based learning promotes leadership and collaborative skills that are important to empowering students to solving community and global problems."

3 *Connections to the Product Lifecycle:* Before Guadalupe Tapia became an educator, she was a clinical laboratory scientist. She spent 23 years working in a clinical lab and knows the importance of ensuring that biotechnology students understand the connection between what is being taught in the classroom and to the Product Lifecycle. The development of a new therapeutic product (a new medicine or biologic) is a time-consuming, complex, and costly process. This process is vital to delivering safe and effective medical treatments.

- The four main stages of the Product Lifecycle are:
  - Discover
  - Develop
  - Manufacture
  - Commercialize

Each stage consists of a spectrum of jobs and careers, not all of them STEM in nature, that students should be exposed to. Marian Wright Edelman once said, "You can't be what you can't see." Wright Edelman, American activist for children's rights and advocate for disadvantaged Americans, voiced the need for children to know what options they had regardless of disability, culture, ethnicity, or socio-economic status. Ms. Tapia believes in the same principles. She ensures that she creates opportunities for students to meet diverse professionals, throughout the product lifecycle, to ensure her students know the umbrella of careers that exist within the field of biotechnology. Ms. Tapia believes that if we encourage students to return to their own communities, they can help break down barriers and address health disparities. This can only occur if they find a career that they are passionate about and wish to pursue.

"My dream for my students is that they all get a good education and pursue a career they are passionate about. Students have so many choices within the product lifecycle."

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Theme 1

Continued

Empowering Students

REFLECT

Now that you have had the opportunity to journey into three separate classrooms, take a moment to reflect on your teaching practice:

1	What are inequities in your community that your students may be passionate about or feel impacted by? How could you connect with your students and ensure that your curriculum is reflective of addressing these inequities?
2	What components of PBL are you already using in your classroom? What shifts would need to occur, in your practice or schedule, to allow for PBL? How could you use PBL to empower your students to solve community or global issues?
3	How does Guadalupe ensure that the product lifecycle is reflected in her classroom? How can you expose students to careers throughout the product lifecycle? What careers are important to addressing inequalities or health disparities within your community?

LOOK FORWARD

We had the opportunity to venture inside the classrooms of Sam, Pete and Guadalupe. Hopefully, you are now beginning to visualize how you can empower your students to solve real-world problems. Below are some next steps to consider, as you work towards weaving these practices into your educational practice.

1	Analyze your current practice and curriculum to determine a good entry point for these elements, in your practice.
2	Consider the steps Sam introduces in laying the foundation for empowerment of your students.
3	Introduce Futurelab+ PBL lesson to your students when you are ready.
4	Connect your students with professionals throughout the product lifecycle.

Theme 2

Pedagogical Practices

REAL-LIFE CONNECTIONS—FUTURELAB+ IN ACTION

The goal of this section is to help you connect with educators and consider how to utilize pedagogical practices to create a safe and inclusive classroom environment that is culturally and linguistically relevant.

1 *Challenging Conversations:* Sam Long seeks to create a learning environment that is safe and inclusive; one that cultivates cohesion and fosters respectful challenging conversations among students. Sensitive and controversial topics often arise in the science classroom. Race, class, gender, religion, or politics are vital topics to discuss. These necessary conversations can only be had when students trust their teacher and feel safe to have these discussions. Sam begins building trust with his students by sharing his identity and pronouns. When he shares his story and fight for justice, it resonates with his students. Being vulnerable helps to start building a community within the walls of your classroom. When you model the ability to be vulnerable and have challenging conversations, it paves the path for further honest, respectful, and necessary conversations. Students need to feel that they are known, seen, and that they matter in a classroom. This allows students to feel as though they can be their whole selves in their science classroom, which can lead to greater learning experiences for all students and the teacher. When this classroom culture has been built, students feel comfortable bringing forth their ideas, sharing, and having conversations about difficult topics. Sam encourages educators to see necessary conversations as a good thing because you allow students to think about the world beyond your classroom and the implications of science on society as a whole.

"When you share something about your identity and share something that takes vulnerability, students can see the relevance of that. It can resonate with students in a lot of ways and some students are really passionate about justice."

2 *Computational Thinking:* Pedro Delgado uses computational thinking to ensure that his students become the problem solvers of tomorrow. Computational thinking is more than just a buzzword; it is a necessity in the science classroom. More than ever, it is vital that students have computational thinking and computer science skills if they are planning to enter STEM career fields. Incorporating computer science into your classroom is not as difficult as it seems. Pedro teaches students to break down problems, analyze data, discover their own conclusions, and communicate solutions to peers. This is a framework that they can use in all aspects of their lives. Pedro prepares students to be autonomous inside and outside of the classroom. He does this by embedding computational thinking strategies in all of his classes.

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Theme 2

Continued

Pedagogical Practices

This allows his students to breakdown large problems. You may recognize that computational thinking strategies are something you are already infusing into your classroom now. The next step is to give a structure to the process of computational thinking to allow your students to work through these strategies. Pedro sees computational thinking as the method that will help them accomplish his ultimate goal: that students feel empowered to change the world.

"I want my students to be thinking to address problems. I give them expectations, have them propose ideas, and develop processes for how they will accomplish their goals. I am never surprised by what students come up with anymore."

4 *Equity Practices in the Biotech Classroom:* Guadalupe Tapia believes that science classrooms should provide cultural relevance to students. She ensures that her students bring their culture and identity to the classroom. Using Culturally and Linguistically Responsive Teaching methods utilizes cultural learning tools that students already have. These practices recognize the cultural capital and tools of BIPOC students. It is an inclusive approach to ensuring relevancy for student learning. Culturally and Linguistically Responsive teaching promotes respect for student differences, allows real-world problems to be addressed in the classroom, draws on student culture to shape instruction, recognizes and addresses bias in systems, models high expectations for all students and ensures that communication is linguistically and culturally responsive. Guadalupe uses various strategies to ensure that she affirms and validates the culture of each of her students. This includes allowing her students from diverse backgrounds to speak and ask questions in the language that they are most comfortable speaking in. This begins with taking the time to get to know each student and their diverse backgrounds. Only then can your instruction be Culturally and Linguistically Responsive.

"Culture plays a very important role in the learning environment. Your students are coming from diverse backgrounds and ethnicities. You want them to feel accepted as themselves. My goal is for students to feel comfortable and know that I understand and see them."

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Theme 2

Continued

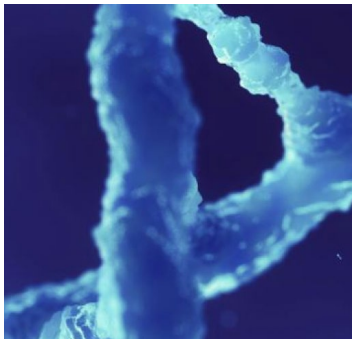
Pedagogical Practices

REFLECT

Now that you have had the opportunity to journey into three impact-driven classrooms, take a moment to reflect on your teaching practice:

1	Sam begins with vulnerability as a foundation for an inclusive and safe classroom. How can you create a safe and inclusive environment for your students? What ways can you show vulnerability with your students and model necessary and challenging conversations in the science classroom?
2	How does Pedro support the use of computational thinking in his classroom? How does this drive students toward solving everyday problems and provide a foundation for future STEM careers?
3	What systems does Guadalupe have in place to ensure students bring their culture and language to her science classroom? What are ways you can validate and affirm student culture in your practice?

Resources



The following Futurelab+ resources can be used to assist you in furthering your understanding of pedagogical practices that will empower you and your students:

1 Explore Classroom Resources that give students access to industry professionals, empowering them to become compassionate, collaborative, and creative leaders who will solve the most pressing social challenges in biotechnology and beyond.

2 Take a deep dive into our Instructional Support documents that equip you with strategies to engage students from diverse racial, ethnic, and cultural groups.

Engage in these resources and discover more about:

- Culturally and Linguistically Responsive Instruction
- Connection to the Product Lifecycle Computational Thinking Practices
- Advancing Inclusive Research

Look Forward

We had the opportunity visit the classrooms of Guadalupe, Pete and Sam. Hopefully, you can see where these pedagogical approaches connect to your teaching practice and educational journey. Below are some next steps to consider, as you think about what these practices would look like in your science classroom.

1	Consider how to create a safe and inclusive classroom for all students.
2	Provide various opportunities for students to engage in real-world problems within their classroom, school, and community.
3	Allow students to analyze global or community problems that do not have solutions, using computational thinking.
4	Encourage students to bring their entire self into your science classroom.
5	Ensure that communication with parents and students is culturally and linguistically relevant.