Science + C
ADVANCING SCIENCE THROUGH COMPUTING

How can a science teacher help students better understand scientific phenomena through computer modeling and simulation?

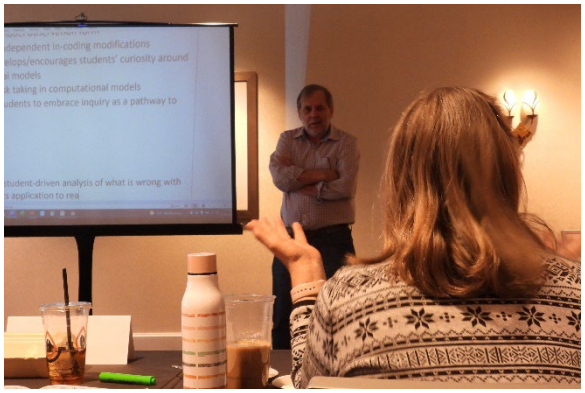
What does a teacher need to know and be able to do?

With their teachers' guidance, high school biology, chemistry, and physics students in Massachusetts and New Mexico have been strengthening their science knowledge via Science+C units. These students use tailored computer models to explore real-world scientific phenomena; explore the code driving the model to identify the science concepts embedded within; assess the validity of the model (whether it matches what they know about the scientific phenomenon being modeled); and make modifications to improve it. Then they run new experiments with the modified model to determine the impact of their changes. Teachers have seen their students engaged in and empowered by the process, and experiencing "Aha moments" as something suddenly became clear. Per a Science+C teacher: "When [my students] were successful decoding the procedures, and even more so when they could successfully modify the code to change the simulation, they were so excited!"

Science+C teachers are hooked by their students' successes, and they want Science+C to be accessible to their colleagues and other teachers around the country. However, what exactly do teachers need to know and be able to do to become an effective science teacher who effectively integrates computer modeling?

Over a beautiful weekend in May 2022, a panel of expert Science+C teachers put their heads together to develop an occupational profile of a Science+C teacher. They did this by participating in a DACUM (Developing a Curriculum) workshop, a method used to analyze both established and emerging occupations resulting in a profile of an expert worker. After a lively discussion, the panel agreed upon an occupational title (**Science+C Teacher**) and a one-sentence occupational definition that succinctly describes their profession: *the science teacher with computer modeling integrates computing to support existing science curricula*. This definition served as the foundation for the panel deliberations that followed.

Then, through a process of brainstorming, dialogue, and wordsmithing, **the panel articulated the essential activities that comprise the work of an effective Science+C teacher**. Knowing that the result had to be clear and encompassing, these teachers carefully reflected as they went through each section and analyzed each piece. What exactly had they meant by a particular phrase? Does a particular word really convey the right meaning? Was anything missing, or in the wrong place?



When the weekend was complete, the participants had developed a full first draft of an occupational profile of a Science+C teacher. The profile presents the essential activities performed by Science+C teachers in the form of a matrix that displays major work responsibilities (duties) and their related work activities (tasks). In addition, the profile identifies the skills, knowledge, and behaviors of an effective Science+ C teacher.

Education Development Center Distinguished Scholar Joyce Malyn-Smith and Senior Project Director Joe Ippolito facilitated the process, and will vet this draft with other Science+C teachers to identify any gaps or confusion. Once finalized, the profile will be published on the Science+C site.

"The work we've done on Science+C, helping students develop skills to use and modify computer models, gives students an advantage in their college pursuits and a grounding for any profession in a world driven by technology. We're extraordinarily proud of our developers, teachers, and facilitators who developed our Biology+C, Chemistry+C and Physics+C courses and supported teachers in their initial implementation." – *Joyce Malyn-Smith*

Thank you to these Science+C teachers and teacher facilitators for devoting their time to the DACUM profile development!

- Stephanie Beauregard
- Lesley Dimond
- Susan Gibbs
- Nina Markham
- Loren Messina
- Paige Prescott
- Lynn Sa
- Natalie Stassen
- Alyssa Tausevich