

Science in Maine: Responding to the COVID-19 Pandemic

by Niles Parker and Kate Dickerson

BACKGROUND

One of the most prominent themes to emerge from the COVID-19 pandemic has been an ever-larger recognition by policymakers and the general public of the importance of science in our lives. Maine scientists and practitioners led the way in the United States in responding to the pandemic, not just through creating and administering tests and manufacturing PPE, but in furthering our understanding of which populations would be most heavily hit and how to most equitably address the impact of COVID-19.

But how will these stories and practices be shared? How will nonscientists learn not just about these projects, but about the many other ways in which Maine leads the world in science and exploration?

Most Mainers don't know that Maine companies and scientists are playing such a leading role in responding to the pandemic. There are many reasons for this, not least of them being Mainers' tendency to just put their head down and get the job done. And while this lack of ego is refreshing, it is damaging to Maine. How will policymakers decide how best to support the work of Maine scientific and engineering firms if the policymakers don't know about their successes and failures? How will we inspire the next generation of scientists and innovators if we don't know how science works and where Maine leads?

FOUNDATION

The Maine Discovery Museum (MDM) began with a public forum in 1997 and opened its doors in February 2001. Over the past 20 years, MDM has become a critical player in the education of young Mainers from all over the state, especially in science, technology, engineering, and math (STEM). MDM is about discovery: looking at the world around us with fresh eyes, a lot of questions, and a desire to know more.

Our largest program, the Maine Science Festival (MSF), enables us to reach an additional 12,000 people of all ages over five days in March, where science programming happens in a festival format (hands-on activities, forums, films, exhibits, talks, workshops). As a unique community and state resource, MDM has provided opportunities for exploration and discovery to a far-reaching and diverse population of students and families from across the state and beyond. Prior to the pandemic, we welcomed over 60,000 people through the doors each year, but that's not the only way we serve the public. Science outreach has been a central goal of the Maine Science Festival for the past five years and the Maine Discovery Museum for the past twenty.

But even with all this programming and the work of other partners throughout the state, it is not enough with regards to achieving science literacy in Maine. From our discussions with parents, teachers and

STEM-related partners in education, legislators, and industry representatives, there is an increasing sense of urgency to engage Maine students and adults in STEM education daily. An understanding of science and engineering is vital to Mainers today, even for those who may not end up in careers explicitly related to those fields. This basic understanding is even more critical when you consider the rapidly changing job landscape in Maine away from traditional industries and towards specialized industries and sectors including composites, marine technology and aquaculture, energy and environmental technologies, biosciences, new products and applications for forest products, ever-increasing applications of information technology and artificial intelligence, and technological advances in manufacturing throughout the state and beyond.

We have learned from the MSF and our other programming that we have only just begun to tap into a significant source of interest and support when it comes to highlighting the science that is happening in Maine. Our extensive partnerships and working relationships with research institutions like University of Maine, Jackson Laboratory, MDI Biological Laboratory, Bigelow Laboratory for Ocean Sciences, and industry partners and presenters including IDEXX, GE, Pratt & Whitney, ReVision Energy, and many more provide ample opportunity to feature the work that they do as public science exhibits and programs.

It is clear to us that STEM education in Maine has to expand beyond what it has been, especially when considering introducing science to elementary students. STEM education in Maine has to incorporate a full "cradle to gray"

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approach, where both formal and informal learning about science are incorporated. Such a science education and application ecosystem would ensure that Maine and its people will not be left behind as future knowledge and industries thrive. In the near term, we have identified two related but separate areas where Maine should put resources to both recover from, and build off of, the COVID-19 pandemic, on our way to building this ecosystem.

SCIENCE EDUCATION

MDM's science education programming is extensive and our outreach programs include the Maine Science Festival, Maine Science Podcast, STEM Outreach to Rural Communities, GSK "Science in the Summer," and Discovery Kits, with all these programs also reaching many disadvantaged and underserved youth. We have seen the demand for these programs skyrocket over the past five years, as the growth of our STEM offerings has spread all over Maine—particularly in central, northern, and Downeast Maine. In many areas, these programs fill a gaping hole in science education in our state.

However, MDM's science-enrichment programming is only one part of science education. Research tells us that the earlier we expose children to the wonders of science and stoke their curiosity, the more they retain and the more interest they display in such topics as they grow. The effort to recruit children to a lifetime appreciation for science must begin in the elementary grades. Yet, science is not routinely focused on in those grades, nor are scientific ideas and concepts expanded on and reinforced throughout the K–12 curriculum. The lack of public understanding of science

and how it works that the COVID-19 pandemic has exposed has made it clear that the time is right for a science teachers' academy.

Informal educational organizations and settings, like museums, have a long history of providing hands-on, interactive methods for engaging children with science. MDM's Science Teachers' Academy will partner with teachers, administrators, schools of education at colleges and universities, museums, and other informal science organizations to greatly expand the science that is taught in schools in Maine and better prepare teachers for teaching science. The academy will start with a pilot program that will bring the unique educational approach of informal science education to the more traditional approach of classroom teaching, with two cohorts of elementary teachers (2022–2023 school year; 2023–2024 school year) from around Maine to participate in the pilot program. They will be paired with museum educators and informal science leaders to develop new tools for discussing science in creative and accessible ways. Field trips to museums, sessions at the Maine Science Festival, and small lectures with scientists will shape their curriculum. This pilot project will run until June 30, 2024, and will culminate with the teachers working with the exhibit design team to develop new exhibits in the proposed Maine Science Center. In addition, they will take the curriculum related to these exhibits and knowledge about the science going on in Maine back to their classrooms. The museum will then follow up with in-classroom visits to those schools and maintain communication with the teachers in the cohorts.

This academy will leverage the expertise of informal educators with regards to science teaching and student engagement

and provide professional development and guidance to classroom teachers, blending the best of both classroom teaching and informal science education.

SCIENCE CENTER

How will policymakers decide the best way to support people and companies who rely on science and engineering? How will we inspire the next generation of scientists and innovators? How do we better prepare the minds of children to engage in science, scientific inquiry, and ultimately pursue career opportunities here in their home state? How do older students and adults continue to learn about science outside of formal schooling? How will nonscientists learn about not just these projects, but the many other ways in which Maine leads the world in science and exploration?

For Maine to prosper in the 21st century, it is clear that science understanding, appreciation, and education needs to reach as many Mainers as possible, from the earliest ages through adulthood. Research has shown that 95 percent of the population learns about science outside of the classroom (Falk and Dierking 2010). Most people develop an interest in science through informal learning settings such as museums. Science museums around the world are increasingly becoming the hub for educational discussions and STEM-based discovery, and they are often recognized as a vital complement to formal education. Maine is the only state in the country without a dedicated science museum. So where does that leave Maine and its people?

This vision for a science center is not building for the sake of building. It is not proposing a typical museum with hundreds of artifacts grouped in static

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exhibits. Rather, we are proposing a new kind of facility for Maine that puts the scientific method at the heart of its mission. It will be an active, changing space that blends components of a learning center, a lab, a makerspace, and a stage. It will serve as a collaborative space for the cultivation of curiosity and creativity, a space that can act as a convener of events around the state and leverage them to raise awareness of the many ways that Maine leads in scientific endeavors. In addition, the building itself can be an exhibit—bringing attention to the latest building technologies and energy improvements, the adoption of which will be critical to society's sustainability.

While Maine's motto of "Dirigo" has been true within various scientific fields, much of Maine's approach to the teaching of science and the way in which science is conducted in the state is siloed and relatively quiet. Emerging from the COVID pandemic, we can see that it is time to shine a brighter light on and foster a more collaborative approach to science in Maine. The pandemic has taught us that digitization and remote-only learning are not panaceas for advancing education, particularly science education. Discovery often requires interactivity with in-person and hands-on experiences. We need to rethink how we shape science education and combine the best of in-person and online instruction, traditional classroom and outside-of-classroom pedagogy, and formal and informal learning experiences.

We seek to create a public commons for problem solving and the broader pursuit of scientific literacy. Maine's stated desire to focus on talent and innovation (Maine DECD [2019](#)) will take the combined efforts of formal and

informal educators to nurture the next generation of engineers and scientists. We believe that one of the most important things that can come out of this pandemic is a home base for Maine science, not just a building but an ecosystem that can leverage partnerships with academia, industry, and policymakers, where people of all ages can learn about science and Maine's role in it. Such an initiative demands a collaborative approach to education and economic development that posits new teaching models focused on reaching a greater percentage of Maine's population. An innovative science center, together with a science teacher's academy, will create a STEM education ecosystem for Maine students of all ages, resulting in the continuous science engagement of the Maine public from early childhood through college and beyond.

REFERENCES

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Niles Parker is the executive director of the Maine Discovery Museum in Bangor. Parker has worked at extensively in museums and historical

societies, including the Penobscot Marine Museum in Searsport, the Nantucket Historical Association, the New York State Historical Association, Smithsonian Museum of American History, National Baseball Hall of Fame, and the National Archives.



Kate Dickerson is the founder and director of the Maine Science Festival. Prior to that, she held various positions in the energy & environmental field

with a focus on policy. As founder & director of the MSF, Dickerson has built a collaborative partnership of diverse organizations and companies throughout the state, culminating in an annual celebration of Maine science, technology, engineering, and innovation.