

Busy Hands, Busy Brains

Research shows that the most accomplished scientists are likely to be craftspeople

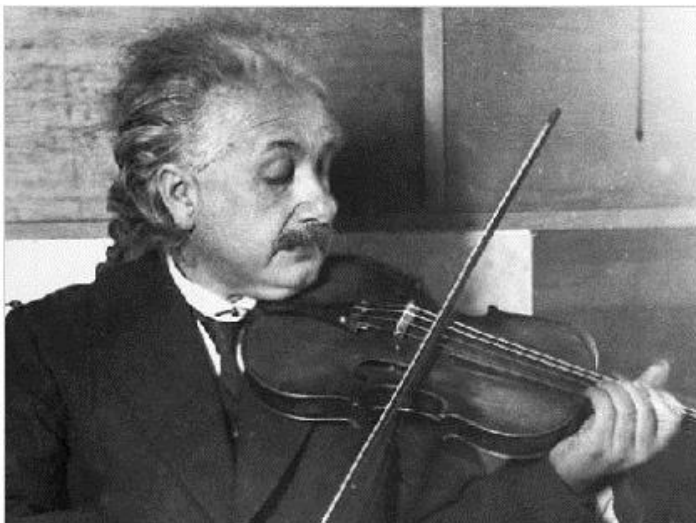
By Joyce Lovelace

Before his landmark scientific achievements, Louis Pasteur was considered one of the most promising young portrait painters in France. Frederick Banting, the co-discoverer of insulin, was one of Canada's foremost landscape painters. Charles Darwin was an inspired travel writer, and an early adopter of photography.

As a graduate student in the history of science at Princeton in the 1970s, Robert Root-Bernstein was struck by this common trait of great scientists: They all had many hobbies and interests, and practiced some form of art or craft. Later, as a post-doctoral fellow at the Salk Institute in the 1980s, he saw the same characteristic in a number of multitalented Nobel Laureates whom he got to know personally – people such as biochemist Robert W. Holley, who sculpted figures in bronze, and Roger Guillemin, a pioneer of electronic painting as well as brain hormone research.

Today Root-Bernstein is himself a distinguished scientist, renowned for his research in biochemistry and autoimmune diseases, and one of the first recipients of the MacArthur Fellowship, known as the “genius grant.” He’s also a visual artist who believes that art and science come from the same creative place.

Big ideas have always interested Root-Bernstein. One of them is creativity, a subject he’s been exploring for decades. Now a professor of physiology at Michigan State University, he is the co-author, with his wife, Michele Root-Bernstein, of *Sparks of Genius: The Thirteen Thinking Tools of the World’s Most Creative People*. He has done several research studies on scientists, seeking to determine what differentiates the great ones from the average. When subjects were asked about their hobbies, “huge correlations” emerged, he says.



"I know that the most joy in my life has come to me from my violin." -Albert Einstein

“The Nobel Prize winners were all artists and poets and musicians, and all very explicitly said there were direct connections between the processes they used as an artist or a musician or a poet and how they did their science.” Craft skills, he notes, are particularly relevant to scientific practice – the fine motor control required to perform surgery or pull a DNA strand in the lab, the keen eye that observes minute differences, the imaginative thinking and problem-solving abilities that come from a deep understanding of material and knowing how to build something from scratch.

Rex LaMore, a colleague of Root-Bernstein at Michigan State, is also interested in the art-craft-science connection, from a different perspective. The head of the university's Center for Community Economic Development, LaMore was intrigued by research showing the potential economic benefits of a thriving arts sector. He joined with Root-Bernstein to explore another angle – as they put it, “whether arts

exposure and arts practice play any role in nurturing the innovative thinking of science/technology entrepreneurs.” This study looked at the art and craft participation of MSU Honors College graduates from 1990 to 1995 who had majored in STEM fields (science, technology, engineering, mathematics), in relation to the patents and businesses they went on to generate in their careers.

The results, published in 2013, revealed that these high-achieving individuals were far more likely to have extensive art and craft skills than the average American is. What’s more, the subjects themselves saw the connection: Art and craft, they said, stimulated their ability to innovate. The most productive innovators, it appeared, were those who kept up art and craft activity from childhood on.

So what does all this empirical evidence mean for public policy, private enterprise, and our daily lives? By cutting arts and shop classes from schools, are we failing to inspire the next Steve Jobs? Are our hobbies more important to our productivity and well-being than we know?

We recently had the opportunity to talk with Root-Bernstein and LaMore about their findings. Here are some of their thoughts, excerpted from our conversations.

ROBERT ROOT-BERNSTEIN

It sounds as though the scientists you’ve studied really valued their art and craft pursuits.

They all had a very interesting time usage. The top people all described themselves, without exception, as lazy. Of course, they weren’t. But what they meant was, they knew they had to take time off to recharge their brains, and their avocations were part of that. Not only did they develop skills, but it also gave them time to get out of this rut of “I’ll think about it, I’ll think about it,” and use other parts of the brain.

The other fun thing was, the people who were average all said exactly the opposite: “I know I’m not a good scientist, because I don’t spend 14 hours a day in the lab, like the really good people.” Well, the really good people don’t do that. One said, “How do I tell my colleagues that I go home and play my piano for hours at night? They don’t know that’s what I do. They think I go home and work on my data or something.”

So it wasn’t just that the top people were much more active in art and craft. It was also that they linked it to everything they did, in ways that the average person didn’t.

There’s a myth in the creativity world that it takes about 15 years to master a subject well enough to become, say, a top musical performer or great ceramist – which means the chances you’ll ever master more than one thing in your life are pretty small. And yet the people we’re looking at tend to master five, six, 10 things. They can’t possibly be going about these one at a time. There have to be connections between the skills.

To what extent is exposure to art and craft a result of growing up in an environment where, say, art and music lessons are part of being on a college track? What about kids who don’t get that exposure? There is always a bias toward very high education among the Nobel Prize winners. They always had good schooling – not necessarily at a better place, but it was very highly valued by the family. But they also all had extremely high rates of art and craft, and that was part of being literate. We also looked at socioeconomics. Nobel Prize winners in general actually are somewhat lower than average; many of them come from farms and working-family backgrounds.

In the later study [of STEM graduates], we actually looked at the amount of art and craft these kids get when they’re young versus their socio-economic status. The kids who come from the richest families get lots of music and fine arts, not surprisingly. The kids who come from the lowest economic [level] get lots of crafts – they’re the woodworkers, metalworkers, ceramists, knitters, and weavers.

And here’s the really interesting thing. We started looking at not just did they succeed as a scientist – which you can do quite intellectually by being at a good university or something – but how many of them took out patents? How many inventions were they making? How many founded new companies? Those were the lower-economic kids, and crafts were the highest correlate. Not the fine arts. Not music. It was handwork that was the highest correlate with becoming an inventor or an entrepreneur, with your own business. If you’re going to invent something, you’re going to have to work with your hands to make a prototype.

On one level the craft-science connection is obvious. We can see the engineering and math involved in, say, woodworking. But you're looking at something deeper.

Yes, there is actually something that my wife and I talk about in our book *Sparks of Genius*. It comes down to "you feel what you know, and know what you feel." And when I say "feel," we don't just mean emotion. Craftsmanship is a set of knowledge about what you can do with materials and tools. But you may never be able to write it down explicitly, or turn it into an equation.

The best people we've met and talked to in every field always say you can learn everything from anything. It means to really master any craft, you have to learn the chemistry and the physics and the engineering and everything else that goes into that – the tools, the manufacture. A ceramist may not be a real chemist, but if they're glazing their surfaces, they sure as heck have a sense of chemistry that's just as developed as any experimental chemist. They may not be able to write all the equations for all the chemical reactions, but they know how things interact, what they do, and how to get effects that probably academic chemists have never even thought of. In some ways they're probably more creative chemists than the academic ones.

One thing that's been going on in the last decade is the maker movement.

Yeah, it's great. What's too bad is that it is "counter." Why in heaven's name have the schools not just jumped on this? The kids are excited, they're doing this because they want to, they're learning huge amounts of stuff. They're doing it the way we want them to do it, which is to explore, fail numerous times quickly, get the answer and then build on it. It's everything we want in a creative curriculum.

REX LAMORE

What jumped out from the survey of STEM graduates for you?

It was the prevalence of [art and craft participation] in those generating patents and starting businesses. So if your interest is creating businesses in your local community, gaining new products and services, then this relationship of science, arts, and crafts seems to be important. Now, the research didn't give us any new information about whether we should pursue a specific art or craft; we weren't able to get that kind of fine detail. But it did suggest that the combination of science and art and craft does lead to that more inventive and creative person, the kind that – from an economic development perspective – communities are seeking to attract or create.

That led us to a second set of research, where we came at it from a different direction. We took a set of highly innovative entrepreneurs, people who had received funding from the state of Michigan's 21st Century Fund to support their economic development idea. We interviewed them and asked, "Do you have an arts and cultural background, practice any crafts, play any instruments?" Again, we found that in fact, yes, in most cases they did.

Any message for our readers?

My wife is an artist. I know what motivates her, and I think it's true for the craft community as well. You're doing it because you love the craft and enjoy the work. Keep doing what you're doing. Try to share it with others, the next generation, because you might be bringing on that scientist who invents the next internet. Do it because it's what you value, but remember it may have value to others. That young person you teach your skill to is now able not only to practice that craft, but also to solve future problems. That's a great gift to offer.