

38 EXAMINING CONSTRUCTIONIST BODIES: INTERVIEW WITH MICHAEL EISENBERG

How do you see yourself as a constructionist?

My wife, Ann, and I together run a lab called the Craft Technology Lab at University of Colorado, Boulder. Our abiding interests have been in mathematics, science, and engineering education, and our way of working is to try and weave together—to integrate—what we see as the best traditions of children’s crafts and construction with the affordances and opportunities of new technologies. I’m always very careful to use “technologies” in the plural because, in addition to computers, these new technologies include things like fabrication tools, which include 3D printers, laser cutters, computer-controlled sewing machines, and so forth. However, more generally, I think that all of these technologies operate together in an ecosystem where they support each other. In other words, focusing on what the 3D printer or the microprocessor can do for education is not as helpful, not as fertile, as considering how the microprocessor or 3D printer fit into a larger landscape of technology and considering how these things interact to enable children’s activities.

For you, what are the core features or ideas at the heart of constructionism?

There are a lot of lenses through which you can look at constructionism and education more generally, and constructionism in particular. There is a technological lens, which I just touched upon. One of the themes about constructionism, for me, is that it’s not reflexively but fundamentally optimistic about the possibilities of technology for children’s lives. A recurring theme in my own work is to keep an eye on new technological developments to see whether some of these technologies could, themselves, be put to use as part of this larger landscape to afford kids opportunity for creative activities.

I also think that there’s an extremely important anthropological or sociological lens through which to look at this, which is to view children’s

construction in the light of what it means to them in the growth of identity. The nature of children's construction is part of this longer process of autobiography construction. Thinking in those terms guides one to think about what kinds of things he might want to design or build. How does this fit into a certain kind of life story for a kid? Not just any old life story, but a life story that you and they might regard as rich or dignified or creative.

This is all related to the reason that in general I don't talk in terms of skill acquisition. I don't use that language when I'm talking about education. Rather, I talk in terms of autobiography construction or construction of a life narrative. It's not that skills are unimportant in that process, they're just not primary. They're things that emerge simultaneously as part of the larger process of building a portrait of who you are. A lot of the emphasis of standard educational rhetoric is we have to provide kids with these skills so that they will be able to do things they want to do. I don't think that's true to people's lives.

In your own work you have focused a lot on crafts and interface design in the context of technologies. What are things that get you excited right now? Where do you see this heading?

I'm really quite interested in technological developments around human augmentation, sensory extension. I regard this as part of this larger technological landscape of empowering kids to be interesting people and to be creative and expressive. One of the recurring themes of constructionism, from the earliest days, is the public display of the things that you build—it's making things that will then be shared or displayed. Part of this autobiography construction for young people (perhaps more so for teenagers and young adults) is actually constructing one's look. It's not just cosmetic or clothing, it's also what are my hands able to do? What are my eyes able to do? There are internal changes that one hones as part of constructing one's narrative. I think that the technologies that allow people to physically expand their bodies and senses with new kinds of extensions or prosthetics are going to increasingly be part of kids' self-definition as time goes on. Our bodies will be the canvases on which to practice crafts, just as other media are the canvases for those expressions now.

What do you think are some big issues for constructionism?

I think the advent of the maker movement has been very interesting and instructive for us in a lot of different ways. Let me circle around to the answer to your question through a couple of themes that I feel are very important to the maker movement and questions of what we do in the future. There are two paradoxes at the heart of science education, I think,

in particular, but also math, engineering education, and education in general.

First, those interested in science education and in design for science education share with me the belief that a growth of interest in science, and in rational thought more generally, is a positive thing in human history. That reason is an extraordinarily powerful and generally benign human tool. However, from the standpoint of design, rational ends do not imply rational means. That is to say, most of the educational rhetoric imagines that there are totally rational reasons for becoming interested in science. We have all these discussions about teaching skills or telling kids that the world needs scientists, that there are all these jobs available for scientists and technologists. We imagine that this will motivate kids to learn science.

That's insane! People become interested in science and math and engineering for the same wonderfully irrational idiosyncratic nutso reasons that they become interested in anything! They become interested in science because they want to impress their boyfriend or girlfriend, or because they want to spend time with an older sibling, or because they admire an uncle or a teacher, or because they're just struck by how awe-inspiring the night sky is, or because they can't take their eyes off of a spider building a web, or ... In other words, they become interested in science out of irrational, personal, idiosyncratic passion. Design has to speak to that. Design has to be done with that in mind. It has to be friendly toward and encouraging of lunatic passion.

The upshot of that is that the vast majority of educational design is, in my view, tangential to most of this outlook. Designs for education often focus on making tools for skill building. But the real crucial things about design are why does somebody become crazy about physics? What can you build to help them answer to themselves and to their friends and relatives who it is they are as they're interested in physics?

The second, and even larger, paradox—one that applies to this political day and age—is that real science education in twenty-first-century America (and maybe in the West more generally) is of necessity a kind of subversive activity. I think the maker movement has, from time to time, realized this and incorporated it into their own rhetoric and style. You see it in phrases like “void your warranty,” “open up the machine,” and “use screws not nails.” There's a certain strain of “don't trust the power structure, make for yourself” in the maker movement. I think that's consistent with the things that I'm trying to say here. In a way I'm touching on a still kind of broader issue, which is that, for the most part, when you hear people talking about the need for science education, ask yourself, what is the image being purveyed

of the scientist? Who do they have in mind? You'll find that there are huge discrepancies between historically the kind of people that scientists are and the kind of lives that scientists lead, and the things that the educational rhetoric is promoting.

When people say, "We want children to be scientists," do they really want kids to spend all day in the woods gathering leaves? Do they want them to spend all night looking at the night sky? I think the closest thing to what they have in mind is a sort of scientific entrepreneurialism. They want kids to be like Bill Gates or Mark Zuckerberg. Those aren't scientists, they're businesspeople! People say, "We want programming." In this context programming usually means, "We want people to work for Google, Microsoft, Twitter, Facebook, or maybe found their own business involving computers."

If money is the metric for success, then the vast majority of scientists are failures—because they're not after money. Gregor Mendel, he was a monk! He crossbred peas, he wasn't interested in being a billionaire, he wasn't interested in founding a business, he was just really interested in this stuff. Maybe there's a way to make big money looking at far away galaxies or gathering seashells, but it's not really the narrative reason that people go into these things!

The upshot of all this is that design—what we do as constructionists—has to acknowledge, at least to ourselves, a certain kind of subversive quality to what we do. I want kids to be able to be scientists with all that means. They'll have time; they'll have resources for reflection and meditation; they won't regard themselves as wasting time if they spend all night looking at the stars; and they won't judge themselves according to the metrics that we've come to associate with late-stage capitalism. Real science is mostly incompatible with that value system.

If you're really interested in science education and math education, you're running against the grain. If you don't acknowledge that in your designs, then you're lying to somebody, to your sponsors, to yourself, to your students. I think that the maker movement has unconsciously tapped into this understanding. In much of the maker movement there is this feeling that we're living off the grid. We're not obeying the powers that be. We're a counterculture. There are elements of all those things! It's a technologically optimistic counterculture, which I find lovely.

Where do you see constructionism going in ten or twenty years?

I believe it will start to incorporate a wider range of technologies. I believe it will start to incorporate some of these biological technologies or

technologies for extending senses and actuation. I think there are growths of certain technologies that will become beautifully incorporated into the constructionist community as long as the constructionist community does not remain technologically hide-bound. That's the technological answer. Part of the answer to your question, which I can't answer, depends on cultural and political developments. Will constructionism and the maker movement fizzle out? Will it be assimilated into the larger skills building rhetoric of the late-stage capitalism power structure? Will it remain true to a kind of subversive style?

On the other end maybe there will be institutions or structures that will start growing up, which will empower this kind of constructionist narrative. That is, many more independent maker spaces that can grant degrees, new ways of earning academic credit—even PhDs or their equivalent—that are founded more on patient, reflective construction and that aren't terribly expensive, ways of circumventing student debt that allow young people to become scientists and makers. Student debt itself can't be dissociated from this question because students who go into large debt then have their choices constrained after school. They have to go after money because otherwise they'll die or they'll be in ruin. Therefore, they're forced to adopt the value structure of the world around them. They don't have the choice.

Things like ways of circumventing student debt are not irrelevant to your question. The future of constructionism depends on social and cultural structures, infrastructure, institutions, and communities that allow people to move away from the current set of tracks. It might be called living off the grid except that maybe over time the grid will become less all-encompassing and there will be many more ways in which people can do this. That's my hope. The technological side of the question is hard enough to answer, but it's still relatively easier to answer than the question of how the world is going to allow for a constructionist life to emerge.