

Episode: *Ethics Teaching and Learning: Molecular Biologists Belong in Art Schools Because Biodesigners Belong in Health Care*

Guest: Andrew Scarpelli, PhD

Host: Tim Hoff

Transcript: Cheryl Green

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[00:00:04] TIM HOFF: [uplifting theme music] Welcome to the Ethics Teaching and Learning podcast series from *Ethics Talk*, the *American Medical Association Journal of Ethics* podcast on ethics in health and health care. I'm your host, Tim Hoff. In this series, we'll talk with educators about teaching ethically complex content to students. We'll discuss strategies for navigating tension between challenging students and trainees and supporting them as they navigate ethical ambiguity and uncertainty. We'll focus specifically on relationships forged among patients, clinicians, and organizations when we work, teach, learn, and assess learning together.

Joining me on this episode is Dr Andrew Scarpelli, president of ChiTownBio and adjunct associate professor at the School of the Art Institute of Chicago. He's here to talk about why biologists belong in art schools and how cross-disciplinary teaching and practice can help advance inquiry at intersections of biotechnology, art, and ethics. Dr Scarpelli, thank you so much for being here.

DR ANDREW SCARPELLI: Thanks so much for having me, Tim. This is a really exciting opportunity to talk about a lot of things I'm passionate about, so I'm looking forward to this. [music fades]

[00:01:16] HOFF: It wasn't too long ago that philosophers started to teach in medical schools. Now art historians also teach in health professions schools, and now microbiologists like you teach in art schools. So it's a great moment in cross-disciplinary teaching and practice. Can you help our listeners understand what a microbiologist does when they're teaching art students?

SCARPELLI: I think that's a really great question, because I tell so many people what I do, and there's a lot of confusion that is shot back at me when I respond. But I think one of the things that we can all agree on is that everyone benefits when every member of our society knows more about important issues that are coming at us. And there are so many different ethical and important sociological problems that are heading our way that are going to be really important for everyone to participate in. And so, I think what's nice about teaching at an art institute is that art students are really excited to try to have conversations about the things that they find important in their life. And so, it can be something very mundane that they run into that microbiology's important for, things like dealing with an illness or live cultures in their food or hygiene and just basic cleaning practices. But I think there's a bigger set of issues that are coming our way that are the loss of effective and universal antibiotics, the need for bioremediation in dealing with plastic pollution and heavy metal pollution. And we're going to have to start dealing with

a lot of ways to communicate with society better about these issues, and we're going to need to have to have deep conversations about the ethics involved with how we deal with them.

And students in the arts want to be part of those conversations. They are observers of society that are making something that communicates back to society things that they find really important. And so, I think it's a really big deal to have microbiologists and other experts of all sorts at art schools, trying to make sure that students feel comfortable talking about these things without having to worry if they have the right information because they have someone there walking with them saying, "This is how we can look at this issue from a couple different angles," and then start to actually talk about that more.

[00:03:25] But I think what's really important about this, and part of what's embedded in your question, is just that everyone benefits from a little bit more cross-disciplinarity. I think most scientists and doctors would really benefit from understanding the basics of art and design, because those jobs are really jobs in communication. And so much of what we deal with as scientists and what medical professionals deal with is communication. And I think we're losing a little bit of the war between miscommunication and strong communication on drugs, on diseases, on basic biological issues. And so, making sure that we can interact with people whose jobs is communication helps us work on our craft, but it also helps them better allow society to really explore these issues.

[00:04:14] HOFF: Mmhmm. So, what do you see as some of the most interesting and important intersections among biotechnology, synthetic biology, and human health?

SCARPELLI: I think that is such a challenging question, because it's not really simple to narrow it down to what's the biggest or most important intersection because they're so intrinsically tied. Synthetic biology and genetic engineering have been really important for our understanding of human health, and especially in medicine, since we started growing insulin in microbes. And I think they've become essential tools for a lot of how we deal with human health. And I think that we have to have a really big conversation coming up about those basic genetic modifications and where they're going, how genetic modification of organisms has really affected so many aspects of our health, not just GMOs in our food and how we can judge the safety of them, not only for our own health in our consumption, but also, the safety of our environment and the safety of the people who are working with a lot of these crops. But we also have to talk about how genetic engineering is starting to affect how we do medicine. Last year, the FDA made an approval for a treatment for sickle cell disease that was based on modifying human genes. And I think that we know that there are at least two babies in the world that—well, at this point, children, they are the—that were the result of genetic modification. And so, we know that genetic modification is going to become even more and more tied to the way that we deal with health and the way that we deal with medicine.

And so, we need to just get everyone on board with what that is and have really strong conversations as all the members of society when it goes to voters and regulators and

consumers and producers and doctors. Everyone has to be part of this conversation to talk about the limits, not just in terms of what we can do in terms of safety or what we can do in terms of just the mechanics of a lot of these tools, but what's going to be ethical, and especially what's going to be equitable going forward. Because I think that's something that we haven't had enough of a conversation as a society about yet.

[00:06:36] HOFF: It might be helpful for listeners to get into some specifics here. So can you talk a little bit about some of the curricula you offer to SAIC students?

SCARPELLI: What I think is really nice is that the SAIC requires that the students take a set number of science courses. And so, I teach basic molecular biology, I teach genetics, I talk about biomaterials, but I also get to teach some really fun courses that are in art and design. So I teach bioart in the fall, which is pretty much the same idea as biotechnology. In biotechnology we're using living things in order to build new technologies. In bioart you're using living things in order to build new pieces of art. And it's not just growing pigments or dyes. It might be trying to genetically modify an organism to be a different color or to act in a different capacity in society, and then ask people to really think about that. But one of my favorite courses that I teach is actually a biodesign course called Synthetic Futures that is part of the curriculum for the Biodesign Challenge. It's an international competition that asks students in art and design to try to take part in helping society grapple with where technologies are going.

And I think what's really fun is if you look at the participants in the Biodesign Challenge, you see some of them taking on basic ethical questions about what genetic engineering is going to mean for human beings moving forward, and other students who are working on different biomaterials and different ways that we can replace plastics or other somewhat toxic materials that we use every day. There are some students who are tackling big environmental issues like invasive species or pollution. And it's really cool to see how artists and designers who are not typically enmeshed in these worlds in their every-, or in these questions in their everyday life, really try to come from a different angle and figure out ways that we can build and design and recontextualize a lot of these really important questions so that they can bring these different projects and these ideas that they're working through to a larger audience that will be more willing to participate and interact with these concepts if they're coming from something that's a little more accessible than a science course, but instead a design or an art course.

[00:09:01] HOFF: Mm. Yeah, that sounds similar to the motivation behind the collaboration between the *AMA Journal of Ethics* and SAIC to support an internship for SAIC students who are interested in health and health care. Part of that internship is learning how, both for the interns and for us, how art can make visible and understandable the health experiences that students have, or how health policy might affect students and their friends and their loved ones. So how do these intersections of ethics, art, and health also emerge in your work with students at the School of the Art Institute of Chicago?

SCARPELLI: Art students are really great at trying to frame questions into ethical categories: Are things good? Are they bad? Are they things that we should be leery of?

Are they things we should be excited about? And I think what's nice is so much of modern biotechnology has these questions embedded inside of it. But I think even more basically, one of the things I've really enjoyed working with art students is that art students want to participate in a lot of the different aspects of how biotechnology's affecting everyone's lives, but they're given a different vocabulary. I think one of the things that's so messy is that we like to talk, in the world of biology—and I'm willing to bet in the world of medicine—in acronyms and in ways that are really hard for people to find access points. And working with art students has made me become a lot more simplistic in the way that I phrase things, and it's really helped me kind of narrow things down to just the key, essential aspects of them. And I think that we all need practice being able to take those long, rambling conversations that we have when we're trying to describe something really important to us and turn that into just the basics.

And so, I think students are excited to start talking about things that they've run into in the world: run into political campaigns that are telling them what the difference between sex and gender are or talking about when it's safe to eat a GMO or when it's not. And to be able to really have those conversations means that we have to kind of sift out the important aspects of what they need to know in order to understand those, be able to figure out what the scientific truths are, what scientific truth is in general, and really have conversations about meanings just because I think there are so many things we take for granted in terms of just, we use a word, we don't really know what it means.

[00:11:34] I think it was surprising to me how many students were completely astounded that we don't have a good definition for even something as simple as life. If biology is the study of life, there's no one universal definition for what life is. If you go to NASA's website versus if you go to an encyclopedia—which dates me a little bit—but if you go to Wikipedia, they're all going to have different definitions for what life is. And what you might've learned in 7th grade biology is different from what a microbiologist would be talking about, or a doctor or an astrobiologist working for NASA.

And so, I think what's nice is that by really having to speak a different language, by having to speak the language of art and design, it's kind of highlighted for me how many of these questions and these debates that we need to have about ethics in health care and health and our basic biology really comes down to having a shared language that we can actually have these conversations with, and really working towards that shared universal way of talking about things, so that we can actually get to the fun and exciting aspects, the what do we do with these new technologies? How do we help people? How do we make sure that these new tools that we're coming up with are going to be for everyone? And it's going to be something that is both distributed ethically and equitably and something that everyone is going to feel comfortable with when they have access to it.

[00:13:04] HOFF: Mmhmm. You mentioned that art students have a knack for identifying those ethically loaded questions and situations, which is definitely something that we've found while working with SAI students as well. On the other hand, which microbiological science concepts are the most difficult for your students to engage with, and in which do they seem to have the most interest and are most energized by?

SCARPELLI: I think one of the things I've noticed is that if there's controversy, art students really enjoy them. And so, it's a lot of times the questions that society is already asking of the medical community, the scientific community that the students are most fascinated by. It is where genetic engineering is going. It is questions about where medicine, personalized medicine, is going. It's where biosecurity's going. It's where food security's going. It's about our environment. It's about what organisms live on us and in us, and how to make sure that we are staying the healthiest. I think art students are trying to figure out so much of their life and put it into their work so that they can communicate the things that are important to them, but that means a lot of the things that are most exciting to them are the things that are most exciting to everyone. It's fun to talk about the microbiome with art students because they have all of this preconceived information or preconceived ideas of what is healthy: when you need to be drinking your kombucha versus when you need to be eating processed foods, or if you can eat a GMO.

And I think what's strange is that it's become rote, that a lot of people will say GMOs are bad, probiotics are good, but we don't know what these terms mean. And so, just being able to break these down, talk about them a little more, and then let the students feel like they have some agency in it, because it's not just you're told to take this because it's good for you. Instead, being able to figure out what that actually means. How does this actually result in them being able to change their lifestyle? If you are told all the time that brewing your own kombucha is something that's a really great idea because it's good for your health, being able to answer why is a really big deal. And so, being able to say, "Let's actually break this down a little bit and talk about why this is important" is fun.

[00:15:21] At the end of the day, the most important things, the most appealing things to students are just talking about things that everyone else is already talking about. It is those topics that are in the news about new medicines that are being approved, things that are not equitably being distributed, food security, equity in medicine and access to medicine, personalized medicine, biosecurity. These are all things that when they hear about them, they're interested in them because they know it's important. But they need a little bit of extra guidance just being able to figure out how that contextualizes into their lives.

[00:15:57] HOFF: Mm. Yeah, I think that helps clarify why these cross-disciplinary efforts are so important and deserve some more attention. I was unaware that SAIC even offered this kind of coursework. But hearing you talk about it, it does seem that art students, of course, would have some kind of legitimate interest in science concepts that they would want a space to explore.

SCARPELLI: I think what's so nice is that that's probably true for everyone, though. I'm willing to bet that there are people in the English department at a small liberal arts school who are going to be just as excited about learning why every papaya that they eat is probably a genetically modified organism, and that's okay. And why the cornfield out back is a genetically modified organism that they might have an ethical concern about. And so, the fact that we don't talk with everyone as if they were interested in these things because they're not pursuing a degree in medicine or microbiology or

genetic engineering is a huge disservice to society, and it allows people to check out and not really think about a lot of these different issues. And that's a disservice to us as scientists or medical professionals or ethicists, because the more people who are participating in these conversations, the more likely we are to actually have progress on getting society to accept things or to think critically about things. And so, having microbiologists at the Art Institute is a great idea. But I also think having designers at a medical school or at a science program are going to be really important to make sure that we're better at communicating these things. And so, I really wish that there were more art courses and design courses in engineering schools or in medical schools, just because I think that it's important to have this exchange and make sure that the strengths that we see in some of these fields are not just kind of encaptured only in those places, but they're something we can share in every profession.

[00:17:49] HOFF: We're approaching the end of our time here, but I'm sure you could talk about this forever, and I could listen for at least that long. So if you were to give an hour lecture to health professions students in, say, medicine, pharmacy, and nursing, what would be the top three things you'd want them to learn about biodesign?

SCARPELLI: If I had an hour to talk about this, I think the three things that I think are most important is that people outside of medicine and science are interested in what they do. I think what's so great is if you go through the Biodesign Challenge website and look at all the past projects that they've had, so many of them are interested in the intersection between design and medicine and pharmacology and nursing and ethics. And there just, there is a real interest in the artistic community in what the implications of a lot of this are. And so, that's the first thing that I would say from the get-go: There is an interest in what you do.

And the second thing I would say is that we need to be better at communicating to everyone, just because we need to make sure that everyone's involved in this conversation. And artists can be really great allies in that conversation, because artists' entire career is based on whether they can communicate their ideas, their emotions, their thoughts in a way that's going to change the way that you feel about the world around you. And so, artists are interested, artists are great communicators, and can be really great tools for people within the science and medical communities as ways of helping us communicate things that we find important.

And then lastly, I think it's they can also be really great collaborators. I think what's really fun is every once in a while, you see bioartists and biodesigners working to help scientists and to help medical communities actually communicate what they're doing or figure out ways to explore the ethics of what they're working on in really fun and meaningful ways. And so, I think narrowing that down again to just, to three really simple concepts, it's that there is an interest in what we do, that it is important that we are reaching out and that we're having communication back and forth, and then I think it's the fact that artists and designers want to work with scientists and medical professionals in ways that are going to help them advance their practice. And it's also going to help us better communicate and interact with society. [theme music returns]

And so, I think that's my biggest takeaways, I think, from, that I would want to impart on an audience of health care professionals.

[00:20:29] HOFF: Dr Scarpelli, thank you so much for your time on the podcast today. I appreciate it.

SCARPELLI: Thank you so much for having me. This was really fun!

HOFF: That's all for this episode of *Ethics Teaching and Learning*. Music was by the Blue Dot Sessions. Thanks to Dr Scarpelli for joining us. Head to our site, journalofethics.org, for all of our podcasts, articles, full issues, artwork, and CE opportunities, all available for free. We'll be back with more *Ethics Talk* soon. Talk to you then.