


POLICY DIALOGUE

# Policy Dialogue: Online Education as Space and Place

Carroll Pursell<sup>1</sup> and Toru Iiyoshi<sup>2\*</sup> 

<sup>1</sup>Department of History, Case Western Reserve University, Australia and <sup>2</sup>Center for the Promotion of Excellence in Higher Education, Kyoto University, Japan

\*Corresponding author. Email: [iiyoshi.toru.6m@kyoto-u.ac.jp](mailto:iiyoshi.toru.6m@kyoto-u.ac.jp)

## Abstract

The rise of online learning over the past few decades has raised fundamental questions about the kinds of “spaces” and “places” this mode of education creates. Do they support meaningful exchanges? Can they advance educational equity, access, and community-building? Are they comparable to in-person classroom experiences? The recent COVID pandemic and the global turn toward virtual learning in response have brought such questions into sharp relief. These were the questions and contextual factors that brought distinguished historian Carroll Pursell and international educational technology authority Toru Iiyoshi together for this policy dialogue. Their conversation takes readers on a wide-ranging discussion about the interplay between education, technology, and society writ large. And they offer insights into the past, present, and likely future of education in an era of accelerating technological change.

Carroll Pursell is the Adeline Barry Davee Distinguished Professor of History (Emeritus) at Case Western Reserve University and Distinguished Honorary Professor of History at the Australian National University. He held faculty positions at the University of California at Santa Barbara and served as the Andrew W. Mellon Distinguished Professor of the Humanities at Lehigh University. Pursell is a fellow of the American Association for the Advancement of Science (AAAS), and former president of both the International Committee for the History of Technology (ICOHTEC) and the Society for the History of Technology (SHOT), which also awarded him its Leonardo da Vinci Medal for outstanding contributions to the history of technology.

Toru Iiyoshi is professor and director at the Center for the Promotion of Excellence in Higher Education at Kyoto University. Previously, he was a senior scholar and director of the Knowledge Media Laboratory at the Carnegie Foundation for the Advancement of Teaching. He also served as senior strategist in the Office of Educational Innovation and Technology at Massachusetts Institute of Technology. Iiyoshi is a member of the World Economic Forum’s Global Agenda Council on Technology and Education and past recipient of the Outstanding Practice Award in Instructional Development and the Robert M. Gagne Award for Research in Instructional Design from the Association for Educational Communications and Technology.

*HEQ* Policy Dialogues are, by design, intended to promote an informal, free exchange of ideas between scholars. At the end of the exchange, we offer a list of references to readers who wish to follow up on sources relevant to the discussion.

**Keywords:** educational technology; online learning; digital transformation; media literacy

**Carroll Pursell:** The word “space” doesn’t quite compute for me in the context of online education.

**Toru Iiyoshi:** It’s more like learning spaces or spaces for learning and teaching. A classroom space isn’t the only space on campus or in schools.

**Carroll Pursell:** Well, with technology, as with most things in life, there are trade-offs. So, one can say that we gain “spaces” through online teaching and learning, but we also lose spaces. I recall going out after class and having coffee at the student union with the students who wanted to keep talking. I remember as a student being invited by professors once every semester to their house for dinner. And I would see their study and their bookcases, and that was an education for me. It made me want to be like them; I thought it was very important. I hate the idea that this sort of thing might be lost. After lecture, a group of us would usually go out and get a cup of coffee and not just talk about the lecture, but about other things. We would get in long arguments about questions like, “Do you have to be Catholic to write a history of the Church?” Those experiences that I had were, to me, very precious and shaped my life and career. The more spaces, the better, obviously. But I think we need to be aware that if changing the technology changes the spaces, we should be cognizant of what we’re losing as well as what we’re gaining.

**Toru Iiyoshi:** Carroll, I think you touched upon very important aspects and issues on how we think about “space” with online education. Under COVID-19, many schools around the world are experiencing or exploring how they can “deliver” education online. I often joke to my graduate and undergraduate students, and also my faculty colleagues, that I’m getting tired of two-dimensional teaching and learning. Often, it happens on a 13-inch screen on your laptop or tablet. Or, we know some students use smartphones, and those screen sizes are five or six inches. If that’s a kind of “space” for learning and teaching, it’s a pretty pathetic one. We know online education is often more of a one-way delivery, like a slideshow or a YouTube video. Those are great educational materials, but it’s kind of sad to see that one-way mode in day-to-day college classrooms online.

So, how could we expand this kind of one-directional, small-screen, slide-based education? Well, there’s the notion of a flipped classroom. Maybe those one-way lectures should be flipped, and that would be a way to support on-demand learning. But what’s most important, and what’s missing quite often now is the kind of space and time you’re describing. After class or even before class, students get together, or maybe faculty go out for drinks with graduate students and exchange ideas. Those kinds of occasions and opportunities tend to be missing in current online education.

**Carroll Pursell:** Some technologies, in fact, do not move us forward, but are used instead to find ways to recapture what we’ve lost. In the case of online education, we might be trying to find some way of reproducing, even if not perfectly, the sort of intimate contact and unexpected meetings that happen in real life. The kind that we had, and that we want our students to have the advantage of. Instead of moving forward, we’re actually trying our best to loop back on ourselves.

**Toru Iiyoshi:** Yes, I think that's so important. Even with online tools, spaces, or platforms readily available, teachers and students sometimes don't know that those things even exist. And even if they know about them, they might not know how to take advantage of those tools to enrich learning and teaching activities. To stay in our comfort zone, we tend to stick with what we know. Professors might just turn on Zoom and then start talking and showing slides. But "off-time" is very important, too. We can easily imagine that being watched throughout the whole class period would be very stressful for students. And maybe students want to have some informal chit-chat during their time as a group. Or in the classroom, if you see your friends or sit next to them while listening to a lecture, you maybe exchange some memos, or you chit-chat. That kind of thing can be totally possible online.

In terms of classroom policy, I think it's very important how the instructor allows students to actively use chat while somebody is talking. We are still getting used to using the chat function in seminars, to share ideas or reflections. It's almost like watching a movie on DVD with the director's commentary on. Listening to that would be a totally refreshing experience. So, how can we make this kind of experience possible? At a glance, the online class looks like just a one-way conversation, one person talking to others; but again, if that's combined with something like a chat happening simultaneously, that could expand the dimensions of learning. It could make the online learning space more multi-dimensional, so to speak.

**Carroll Pursell:** Well, technology is always changing; it always has changed. But we have two things going on now that are accelerating the pace of technological change or the adoption of new technologies. One is the pandemic. That's forcing us to give up the old completely. We had to tell the students stay home; don't come on campus. And to make up for that, we've had to ask ourselves how we can substitute the old approach with some sort of technological experience that may not be as good, and that certainly will be different. That's a short-term necessity. But there's also a second issue, a long-term trend, I think. On many campuses, administrators—people who don't teach or maybe never have—are pushing technological changes that they see as beneficial. It's a technology that helps them cut costs or allows them to say that their institutions are at the cutting edge: "Come to our college, give us your tuition because we're already in the future." The problem is that technology, as we've seen many times before, has created a shift of power and authority. In this case, it's from faculty to administration. I think that part of that loss of power and authority is the imposition of new technologies, which do different things, but are not something that faculty have chosen to enhance what we do. They're chosen by somebody else for other reasons. Is that your experience? Is that happening in Japan?

**Toru Iiyoshi:** For those of us who work in faculty development, in Japan and elsewhere, the goal is to try to make online education much closer to face-to-face teaching and learning. We can only try to make it closer, but it will never be the same. But as you said, from a senior administrator's perspective, maybe the convenience, efficiency, cost-effectiveness—and, in this case during COVID-19, safety—dominate policy decisions. Too often, we are not really talking about effectiveness or the meaningfulness of a student's experience in the classroom, and on campus, too.

It's kind of dangerous to believe everything can be replicated or recreated using technology. Of course, there may be new ways of learning or new kinds of learning experiences that can only be possible through new technology. We should be open to those kinds of innovations, but not merely for convenience and cost-effectiveness. "Digital transformation"—that's the buzzword flying around in Japanese education—led by the Ministry of Education. We should proceed with caution, as you suggested.

**Carroll Pursell:** If you hear the word "technology," what springs to mind is not a hammer and nails, or a saw, or a steam engine, or even an automobile. You think of computers. But as a matter of fact there's another technology, which is Japanese. The history of industrial production after the industrial revolution, which was British, had largely been American, until after World War II when Japanese industry began to innovate. One of the most important and now widely used innovations was just-in-time inventory. At my last university, the board of directors were all drawn from business and banking and they were very much intrigued with just-in-time inventory. Here they were stuck with a professor like me, who had taught for years and years, but only taught one thing. They worried that students weren't interested in that model any longer; their perspective was, "We can't hire someone who teaches that new topic because Carroll's here." And I'm expensive. To the directors, I get more and more expensive and less and less relevant. They wanted just-in-time faculty, or what we have come to call "casuals." University managers want to say, "Oh, I saw in the headlines today that this is happening. Students will be interested in that. Let's hire someone on a short-term contract for very little money, and maybe no benefits, to teach that. Then next semester, we'll do something else." Now that is drawn directly from the technology of industrial production. It's not mass production. It's the kind of production that the Japanese innovated so successfully after World War II with their automobiles and electronics. It's a technology, and it's had a devastating effect. It has really meant that faculties have been disempowered. We aren't really running the show anymore.

**Toru Iiyoshi:** When you said just-in-time faculty, I thought of just-in-time learning for students. I've been a big advocate of open education. But the latest moves with massive open online courses, or MOOCs, could be even more risky given your concern. I often joke that, once recorded, even dead professors keep teaching through MOOCs. So, if our starting point is cost-effectiveness, if we start substituting live instructors with recorded lectures, that could serve well in this context of just-in-time learning. There are over sixteen thousand MOOCs around the world in many different disciplines. Students could have a mega-buffet experience where they could just take whatever they want. They could do this with a Harvard professor and some other courses from the University of Melbourne. They could just mix and match. It's like students can be curators of this abundance of learning materials, including video-recorded lectures.

The problem is that if I record my lecture this year, and you keep using it for another five years, that's not very up to date. I imagine five years from now I'll be teaching very different things in different ways. What do you think about that—

that professors keep teaching with his or her kind of signature pedagogy, so to speak? What is the real value for us, and how can we continue to keep that aspect of valued teaching?

**Carroll Pursell:** It's clear there are faculty members, we all know them, who are reading the same notes that they read last year, every year. And that's clearly not a good thing.

Long before the computer was used much in teaching at my then-university, administrators wanted to start satellite learning areas in the little towns around the state in California, where people could come after work and take a course to enhance their skills. There were history courses directed at teachers who have to take a certain number of courses to keep their accreditation as teachers. This was seen as an income source for the university. They wanted to record these, broadcast them, and keep them. We got the union on it and said, "No, these lectures are our intellectual property and you can't run them for the next twenty years, while we don't get anything." So that was a technology that was an immediate threat to our own livelihood. I had tenure, so they couldn't get rid of me, but a lot of my colleagues didn't have tenure. They could have been let go. I think that there is something fundamental about the freedom to do it the way we want.

**Toru Iiyoshi:** Yeah, it's difficult to see how we can secure and protect the intellectual property of faculty members that has already been captured and recorded. Knowledge and ideas can just be repeatedly used without compensating those original authors and creators of knowledge. I think that's huge policy-wise. If that issue isn't settled, I imagine many professors will become more protective and won't openly or freely share their teaching online. It's like the basic income policy question. Not everybody needs to keep working five days a week or seven days a week. At the same time, I think we enjoy getting paid and increasing our salaries as we become more experienced educators and scholars. We recognize that we can intellectually provide to society something that's valued.

**Carroll Pursell:** When we write books, we hope that they get published and we're thrilled if we can sell two or three thousand copies. We want people to read them; we want to share all of that. The only thing that we hesitate about is when we've done the work and someone else gets the profit. If you're talking about opening up the class and everybody in the world can tune in to it, that's fine by me. I'm excited. That many people will never read my books. But on the other hand, I've got to believe that somebody is making money from this. Somebody is gaining power from this. The question we need to ask is, who is it? Is it the creator? Or is it people who have learned how to package it, market it? Somewhere in there it seems to me it's worth their doing it. Just to clarify, there's no way in which I want to keep my research secret. I do not want that, and I don't expect to get rich.

**Toru Iiyoshi:** What you're describing is online open classrooms or open education that began in a very visible way with MIT's OpenCourseWare project starting around 2001. All the top-rated universities, many of them private, started in this open

education movement. And it's kind of heating back up, and that's been one of the big concerns. I think those elite universities tried to lay the foundation for a new kind of business model in higher education. Micro-credentials, for example, can expand the populations who join higher education, or pursue graduate education. This new credential model can also make graduate-level learning communities more inclusive. With that, maybe more faculty members and researchers will start feeling happier, I think, by expanding research and academic communities.

Your thought-provoking book *From Playgrounds to PlayStation* is relevant here. It's interesting to think about using that kind of amusement park metaphor. Let's say that the future of universities is becoming more like an amusement park. Right now, it might be a little more factory-like where you need to take these courses in the first year, and so on. But what if you could go in whatever order you wanted to go? I want to do the roller coaster first, or the merry-go-round next—students might then be happier with what they get out of the amusement park. A faculty member or instructor can be the designer or operator of one attraction, like the merry-go-round or go-carts or whatever. You'd be very happy as more people come to you or are sent to your attraction.

But the question is, if people randomly access those attractions in whatever order, would that make sense in terms of attaining a kind of structured knowledge? Applying that knowledge to their work, their day-to-day living can be very useful. And that's currently what I think about what structured education can offer through a university, college, or school system. I keep asking myself if we are destroying that sequential or more structured, well-thought-out design in knowledge transfer or knowledge creation.

**Carroll Pursell:** Part of our responsibility as faculty is not just to know “facts,” but to have an understanding of what students need to know. I think we can assume that they don't know what they *need* to know. They know what they *like*. They know what they're interested in, but highly educated grown-ups have a sense of, “Well yeah, that's fine. Indulge in that. But you really ought to know this topic.” Or, “Before doing that, you ought to understand this other area.” We may be wrong, and I'm sure this often comes out of prejudice or personal preference, but nevertheless it's a responsibility we have. I think there are ways that technology can enable or disable that.

**Toru Iiyoshi:** With online and other technologies, there are a lot of options to explore. But our time is limited, so that's the thing. Efficiency is the word. I keep hearing, “What is the fastest way to get from point A to B? Because I don't want to waste time.” But wasting time and wandering in this kind of knowledge space, sometimes purposelessly, is part of the luxury of being a member of the academy. My fear is we're losing that valuable, not-so-efficient time.

On the other hand, younger generations can just keep wandering and exploring, and never have a chance to shape whatever it is they will need in surviving this constantly changing world. The grown-ups might not be able to help because they haven't lived in societies of the future. It's easy to kind of get lost in the “infinite learning pathways” that exist right now. Consider these images of how the Tokyo subway system has been expanded over time (see [Figure 1](#)). I see these as a metaphor for



Figure 1. Evolution of Tokyo Subways. Reproduced by permission from Azicore, “History of Tokyo Subways,” Dec. 12, 2020, <https://azisava.sakura.ne.jp/rail/metro-history/>.

understanding how the past doesn’t always serve as a useful guide for the present or future. It’s also a metaphor for increasingly complex “infinite learning pathways” that create new learning spaces.

I was born and grew up in Tokyo until I was twenty-something. Now, whenever I visit, it’s too complicated. I have to use a smartphone app to tell me how I can get from here to there, and with the cheapest fare or fastest time.

Imagine this as a kind of metaphor for schooling. The first image is fairly simple. When you get on the elementary school train, you can take that to the right destination: graduation. But I think the educational world online is becoming increasingly like the Tokyo subway system of the present. With sixteen thousand MOOCs and zillions of open learning materials, everyone can be a teacher of something. That can be a wonderful thing, but it’s also very chaotic, and I think, as you said, people just don’t know where to go. In the future, I think we might need that kind of a smart technology for all learners and people to navigate through, and then enable them to learn whatever they want to learn. Increasing complexity requires increasingly complicated technologies.

**Carroll Pursell:** It’s interesting because, clearly, things are becoming more complicated in many ways. But it’s also true that they’re becoming simplified, and that’s very dangerous. Consider the rise of agribusiness in the United States—the aggregation of small farms, management shifting from family owners to corporations, and concentration on a few key crops. As far as the eye can see, only soybeans. And that’s because other people are concentrating on beef cattle, and there are millions of beef cattle. And chickens. All chickens that Americans eat essentially come from one or two companies. They process these chickens in one or two factories. It’s becoming simplified, and simple systems are notoriously unstable—we know that from a rich body of history of science and technology. So there’s a way in which the complexity of technology has allowed the simplification of applications, which is very dangerous.

I also think we should back up for a minute and get an overview of all of this. We’re talking about educational technology—made up of two different things. I think we should concentrate first on education: What do we mean by it? Is it broken now? Are there things that can be improved? What is it? Is it just the transmission of facts, or is it the transmission of values, or skills? Then, second, look at technology. There’s a whole range of technology, always has been. Chalk is a technology. Which

technologies will enhance what we've already decided is the important thing about education? I think that in doing this, we need to think broadly about education and think broadly about technology, and not just concentrate on one particular technology that is big at the time.

Stanford University historian of technology Joseph Corn once pointed out the dangers of predicting the effects of technology. He said when we talk about technology in the future, we inevitably tend to make three mistakes. First of all, we think adopting this technology will change everything. "We won't do it the old way anymore; we'll do it the new way." That never happens. They layer up. Second is the fallacy he called "social continuity." That is, technology will change what you want, but it won't change anything else. I remember this wonderful picture that goes back to the 1930s, a time when people imagined men would soon commute to work in the city by Autogiro. And everybody would have their own Autogiro, and it's so much better than cars or buses. The picture shows a man going to work. He's wearing a suit and a hat. He has a briefcase and he's kissing his wife in the doorway. The ad in [Figure 2](#) depicts the Autogiro bringing men and women to the golf course. The expectation is that none of that—daily commuting (and only by the husband), leisure activities—is going to change. And then third is the belief in the "technological fix." That somehow, because you've changed technologies, you've solved the problem. Yes, you'll solve some problems, but you'll create other ones. It doesn't fix everything. I think we need to keep those three things in mind as we move from what is education to what technologies are available to enhance it.

**Toru Iiyoshi:** Building on that, let's consider the picture in [Figure 3](#), which is very similar to what you just described. This was from 1969: The Future School.

**Carroll Pursell:** The thing that strikes me immediately is that the robots are much more fun and interesting than the teacher, who looks very boring.

**Toru Iiyoshi:** What I find fascinating is that hitting students was totally okay at that time. I remember being frequently hit by my teachers. I was very naughty. The picture looks like a joke, but people were very serious about using educational robots in that way—to hit children—with multiple robots moving around. And there's this long bar with what looks like a punching ball. I think this is another educational device. But what struck me is how we tend to predict with our current values and value system. The question is: What kind of society or what kind of experience do we want students to have in ten years, twenty years, or thirty years? Then we can imagine what kind of technology might be available. Then I think it will be a more meaningful assessment of which direction we want to go.

**Carroll Pursell:** I'd like to get back to complexity for a minute. We have a Japanese car, and I was thinking about the first car I had. I'd been watching my dad work on cars before I had a car. This car I have is serviced once a year. In between services, I never look at the water level in the radiator. I never look at the tire pressure. I never get the dipstick and see if there is enough oil. I never check the gap in the spark plugs. It's become for me, the user, much more simple. For repairs, I can no longer fix



*will Rottingwood  
myvintagevogue.com*

**SECURE AND PRACTICAL FOR RECREATION AND UTILITY**

Open areas surrounding almost any country club offer room for the owner of a Pitcairn Autogiro to fly directly to his golf game. Requiring little room to take off and even less to land, the pilot owner can fly directly to the scene of almost any sporting event. The practicality of such use has long ago been demonstrated by those owners of the Pitcairn Autogiro who have flown to football games, race tracks, hunt meets and other social gatherings in many locations. The ability to land on and take off from any reasonably sized open ground with security frees the pilot from the necessity of seeking a safe landing only at the large airport. The 1932 Pitcairn Tandem has been refined in design for greater speed and pleasure. Improved streamlining and more engine power add to speed. Tandem cockpits that afford the full visibility so desirable to the amateur flyer, have dual controls to permit sharing the sport of flying. A demonstration can be arranged at the point where you would use your own Autogiro. Write for descriptive literature.

PITCAIRN AIRCRAFT, INC., PITCAIRN FIELD, WILLOW GROVE, PA.

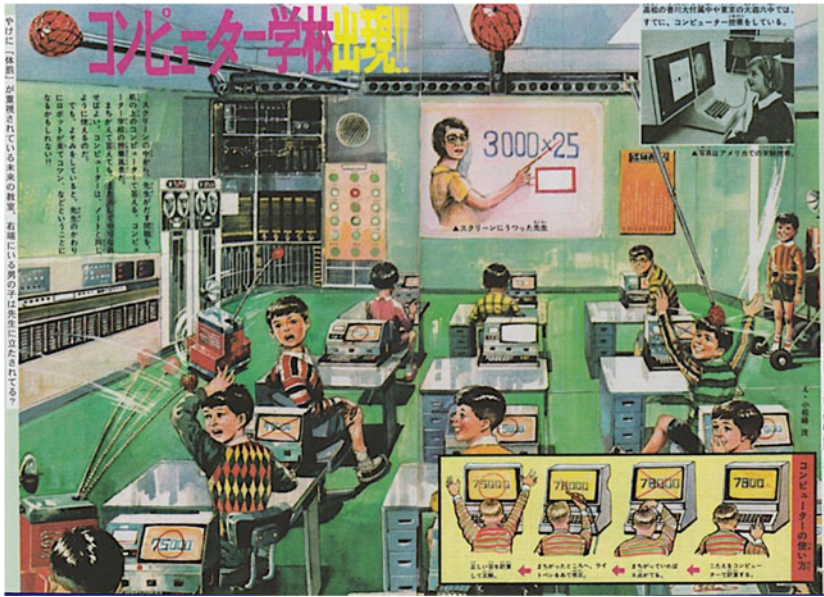
**PITCAIRN**

*autogiro*

Figure 2. Pitcairn Aircraft, Inc., advertisement, 1932. <https://www.thisdayinaviation.com/tag/autogiro/>.

things on my car like I used to. I have to take it to someone who has a computer to hook up to it to find out what's wrong and what it needs. And they will replace a bad part, of course. They won't fix; they'll replace. In a way, the increase in complexity of the technology itself has simplified the experience of using it. It's sort of ironic.

**Toru Iiyoshi:** It is ironic. I can remember as a boy disassembling clocks or cameras and putting them back together, and I often failed. I think that fun kind of tinkering learning space has been removed or reduced.



**Figure 3.** The Future School, 1969. Source: Shigeru Komatsuzaki, “Computer School Emerges!” in ed. Kenichi Hatsumi, *Futuristic Illustrations for Kids of the Showa Era—Our 21st Century* (1969; repr., Kyoto: Seigensha Art Publishing, 2012). Reproduced by permission of Seigensha.

When my second son was growing up, he said, “Oh, I don’t play with Lego blocks, that’s boring.” When he was in middle school, he was playing with Roblox. Roblox is a virtual world that allows kids to build Lego block-like structures and play together online. He said, “Well, I could invite my friends and people who I will never know to come play in what I built. That makes me feel happy. I can enjoy that and just watch people play.” And I thought, maybe he has a point. So, what aspects or elements should we preserve and further expand? Take your example of the simplified, computerized automobile. Cars used to be learning opportunities for us in terms of how engines or automobiles work. But maybe we can learn that in different ways.

**Carroll Pursell:** We began with spaces, and I’d like to bring up another space. The issue of another learning environment, which is social media. And I find it kind of terrifying. In Australia, we’re meeting a lot of resistance to the COVID-19 vaccine. Something like a third of Australians don’t want to be vaccinated. And when they interviewed somebody on TV, just some regular citizen, and asked why not, the person said, “I researched this.” What that means is that they got on YouTube or Facebook, or they Googled “vaccine” and god knows what they found. The world is full of conspiracy theorists, and they’re all on social media. That’s a huge new learning environment. And we don’t know what goes on in it or how to regulate it. It seems to me the kind of unmediated knowledge that’s out there in social media is dangerous when there are a lot of people who don’t know, apparently, how to judge who is saying what and whether they know what they’re talking about.

When we're teaching, people know who we are. They know our background. They can look us up. They can read our books. They may disagree with us, but they understand that we are talking about this from a position of longtime study and knowledge. But none of that mediation, as far as I know, occurs in this other huge learning environment. That's a very dangerous thing and I don't want to import any of that into what we do.

**Toru Iiyoshi:** Right, we're caught between a social media free-for-all and the problem of censorship. We're also talking about credibility or accuracy of information and knowledge, and how that impacts the education process. I think it's out of control everywhere. But the question is: How can our schools or education systems try to control and reduce the danger? I don't have an answer, but it's a big issue. In each nation, media literacy is increasingly becoming important for young people and students to attain. And I think many schools have started teaching that, but it's still not enough.

**Carroll Pursell:** Moving forward, researchers in the history of technology have to expand their limits in what they're going to look at. We tend to privilege production over consumption, design over use, and change over stasis. And I think those are all dangerous in that they limit the questions we ask and the questions we look at. Technologies are both produced and used, and we need to look at both sides of that. I think that some technologies are new, but I think they layer up, and we still have to deal with old technologies. Looking more widely at the field is what we need to do in order to understand the past, certainly, but also the present.

**Toru Iiyoshi:** I would really appreciate any lessons learned from a historian's perspective. From my point of view, whenever a new technology emerges, society changes. And the way we do things sometimes changes radically. What I'm saying is that it's not education that spearheads the technology. Rather, it always follows. But the advancement of technology is so rapid these days, and changes in education move rather slowly and often miss their target, so there are lots of trials and errors in shaping the education system.

One of the biggest concerns is if research on the meaningful use of technology in education can ever catch up with the speed of the change of society. In the eighties and nineties, technology advancements for teaching were a lot slower than they are now. There was ample time for educational technology researchers or education researchers to try things out and find out what works well. It was a very good time for the field. But now, every day there's new technology that could radically change the way we learn.

### Additional Readings

- Alexander, Bryan. *Academia Next: The Futures of Higher Education* (Baltimore: Johns Hopkins University Press, 2020).
- Christensen, Clayton M., and Henry J. Eyring. *The Innovative University: Changing the DNA of Higher Education from the Inside Out* (San Francisco: Jossey-Bass, 2011).
- Corn, Joseph J., ed. *Imagining Tomorrow: History, Technology, and the American Future* (Cambridge, MA: MIT Press, 1986).

- Crow, Michael M., and William B. Dabars. *The Fifth Wave: The Evolution of American Higher Education* (Baltimore: Johns Hopkins University Press, 2020).
- Edgerton, David. *The Shock of the Old: Technology and Global History since 1900* (Oxford: Oxford University Press, 2007).
- Iiyoshi, Toru, and M. S. Vijay Kumar. *Opening Up Education: The Collective Advancement of Education through Open Technology, Open Content, and Open Knowledge* (Cambridge, MA: MIT Press, 2008).
- Maloney, Edward J., and Joshua Kim. *The Low-Density University: 15 Scenarios for Higher Education* (Baltimore: Johns Hopkins University Press, 2020).
- Pursell, Carroll. *From Playgrounds to PlayStation: The Interaction of Technology and Play* (Baltimore: Johns Hopkins University Press, 2015).
- Pursell, Carroll. "Technologies as Cultural Practice and Production," *Technology and Culture* 51, no. 3 (July 2010), 715–22.
- Pursell, Carroll. "Seeing the Invisible: New Perceptions in the History of Technology," *Icon* 1 (1995), 9–15.