Conversations with a Prominent Propagator: Amy Ko

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Encouraging faculty to adopt new, high-impact teaching practices, tools, and curriculum in computer science (CS) undergraduate education requires intentional planning and sustained effort. This article is the next installment in the series of interviews with prominent propagators: members of the CS education community who have successfully spread pedagogical or curricular innovations. The goal is to capture knowledge and experiences that others can use to propagate their own teaching projects.

For this article, we interviewed Amy Ko, Associate Dean of Academics and Professor in the Information School of at University of Washington Seattle. She is the current Editor-in-Chief of the ACM Transactions on Computing Education (TOCE). Professor Ko is known for many things, among them: centering the complete, authentic human in Human-Centered Computing, and incorporating how people bring in past experiences to study, experience learning, and perform Computer Science [2, 6, 7]; scaffolding sensemaking and strategy (e.g. teaching students a strategic approach to coding, rather than blind edit-test; learning to read code before using it, and using better tools) [10, 11]; and equitable, culturally responsive assessment and critically conscious computing methods for secondary education [1, 3, 8, 9, 12].

Below are highlights of the interview, which ran approximately an hour. The transcript has been edited for clarity and style.

Q: How did you get started as a professor and researcher?

AK: I was looking for a summer job in the spring of my freshman year of college. I had this job that was like $5.65 an hour to install wifi. There was this job posting for $7 an hour to be an undergraduate researcher. I didn't know what research was. I went to the professor's office hours and said, “Hey, I'm interested in $7 an hour. What's research?” She said, “My job is to follow my curiosity and tell people what I find.” And I was like, “I wanna do that. Can I do that?” And she's like, “Yeah, you can do that.” That was enough of a vision for me. I could make money and follow my curiosity and tell people about all the exciting things that I found. I'm so grateful that I have had this opportunity.

Q: What drives your work?

AK: I have always been interested in thinking about computing less as a skillset or a profession and more in terms of what we use computing for, what we express with it. What is this medium? What do people do with it? How do we help them understand it and harness it to their ends? These have been key questions at the heart of a lot of my work. Early on, a lot of that was about tools to help people use this medium in a more productive and expressive way. But that shifted into something that is more about how we help people understand, and it meant moving from things like HCI and software engineering to education and learning sciences.

Q: How would you describe your current work?

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AK: I would say that my core interest is trying to make computing and the learning about it work for everyone. When I think about other kinds of media and the tools that we use, nobody would expect somebody to go into a painting class and then just immediately start painting a masterpiece. You might actually spend a lot of time making really bad paintings and trying to understand what makes other people's paintings really good, and developing a couple of years of aesthetic opinions around what is good and bad. We don't do any of that in a lot of computer science education. It's much more this engineering mindset of making something functional that meets requirements, which doesn't account for the fact that there's different opinions about what makes something good. Instead, we pretend that whatever we've encoded into our style checking guidelines is somehow the only good code. So reading code seemed like a really obvious thing to pay attention to because that's what other practices do. A really key difference is that I think of it as more art-dominant than engineering-dominant.

Q: How has the reception in the computer science education world been to the art-dominant approach?

AK: Half the time, the reaction is, "Oh, that's a really interesting, different perspective. Tell me more." And the other half of the time, it's like, "What are you talking about? I thought we were all here to train software engineers for companies." When I let the more anti-capitalist, artistic-centric viewpoint into the discourse that I write, I usually end up being marginalized, like everybody who tries to do this. Sometimes I have to compromise that a little bit to publish or help my PhD students get jobs. That tension is always at play.

Q: What media and venues have you found to be the most successful for sharing your work?

AK: It really depends on what I'm trying to achieve. For example, we did some work on educational programming games. There was a system we had called Gidget that was trying to explore what it means to sustain engagement in learning and how feedback interacts with that. Our goal was to figure out how we can take some of our key interaction design insights and make sure that they were part of building and designing that other people were doing. That meant a consulting gig at Microsoft where they were starting to work on exploring similar tools. They didn't end up building any, but I think we still had impact there. We spent a lot of time consulting with Code.org as they were building, since they're local here downtown Seattle. I got an email once from an Apple engineer, and I shared all of our papers; Swift Playgrounds came out 18 months later and it was clear that they'd listened to some of the things that we discovered. Those were all different routes of authentic engagement with for-profit and not-for-profit industry.

For teachers, you have to go to where they're learning about teaching. For K-12 teachers in CS, that can be places like a session at the CSTA conference, or professional development. Sometimes we'll try to find our way into those materials, sometimes we'll go directly to teachers. It depends on what we're trying to achieve.

Q: What role do you feel that publications play in propagation?

AK: I've developed a lot of different perspectives over time about when certain genres are appropriate. Publications have one very particular audience: other researchers. It doesn't need to be a place where teachers are learning about what we've discovered. When the research community collectively feels like we've discovered something that is worth everyone knowing, it should be shared in places like pre-service teacher education pathways or in professional development for post-secondary faculty or TA training. A research paper is not the form for that learning.

I always think about our discoveries in multiple forms: there's going to be an archived form and a learning form. Maybe the learning form ends up in some teacher education curriculum somewhere. Sometimes what we've discovered is something that really should be in front of policy makers — in which case, it should probably not be in any of those forms; it should be translated in terms of their own political priorities. The framework I use is that we've discovered something and it should have different forms for different audiences: "Who's the audience and what's the appropriate form for that audience?"

Q: One of the things we see among successful propagators is that there is often a mystery step where a large corporation calls them. Is there a way that we as researchers can manifest this opportunity?

AK: I think that there are some things I do that increase the chances of it. I've spent time building and maintaining my network and encouraging my PhD students to do the same. Then when somebody needs expertise, we're part of their network. And then of course we have a moral obligation to represent more than just our own perspectives because really they're asking for the community's guidance, not one individual's guidance.

There's the other baseline piece of being an expert, and that means knowing more than just your own practice. When we do pre-service in our college of education with our Masters in Teaching students, they're not asking me questions about my work. They're saying, "I don't understand how any of the thousand papers anybody's written tells me what to do in this situation." That's a synthetic question that requires me to be able to answer it in terms of the whole field.

Another thing that I do that I think increases the chances is my prioritization of a certain flavor of entrepreneurial impact. I will do whatever needs to be done to have the impact and not worry about whether it interacts with my promotion constraints or getting a paper out. If they ask for help, I'm going to work at least partially on their terms. That's a really key thing when you're working with teachers to advance their practice or when you're working with industry or government or not-for-profits. Researchers should start at least halfway to where their audience is and bring them whatever knowledge we have.

Q: What strategies have you found that help build a community around the type of work you're doing and your research and also the practice that you've advocated for?

AK: There are so many different ways that people do it. I like to have closer relationships with a smaller number of people. One of my colleagues likes to have a really huge number and know a lot of different people. As collaborators, it is an asset that we have different orientations towards networking and community building. We're stronger when we combine forces because we can bring different things to it. The only other thing I'd say about building and maintaining community is that it takes a lot of work. It's spending a lot of time with people and building relationships, and that's not something you can shortcut. You just have to do it.

Q: For students who are brand new in the higher education community, how would you recommend they build that initial network?

AK: For new students, it's all about building a baseline network of peers. You have to build that group of three or four or 10 other doctoral students who are in the same situation as you at other institutions, who you can gripe about your advisors with. And you can compare notes on your institutions. Once you have that base of support, that community can be a base for growing other bigger professional communities too.

I remember that I was at the International Conference on Software Engineering, ICSE, and it was my first time. I didn't know anybody there, but I just started walking up to a bunch of senior people and just asking them questions and sharing my work. That built my network really quickly. There's nothing that senior faculty love more than people attending to their research. There's a kind of boldness in not being afraid to talk to people in your community, which can be really powerful. I guarantee you they are not offended that you're asking them questions; they're probably really excited.

Q: There's sometimes tension between doing the kind of work you describe and the things we need to do to succeed in academia. Have you seen that tension and how have you navigated it?

AK: The tension is real. And for the most part, I pursued institutions that relieved that tension. At the University of Washington, and at the Information School in particular, there is such an openness and intellectual diversity in what people focus on and how they do their work. I feel like I have utter freedom to do whatever I thought was appropriate; I just had to meet the expectations of external people who would write tenure and promotion letters. I just had to do interesting things and write about them and hope that it worked out. So that's the strategy: avoid the institutions that stop you if you can, and if you can't, try to change them.

Q: What does success mean for you?

AK: I would ask all of us, how do we make *everyone* successful? It's a tiny fraction of us that have these kinds of impact. Don't we want everybody to be able to do that? Why isn't that possible? Why does success need to be a finite resource?

I'll sometimes use a metaphor with my doctoral students around hiking in the Cascade Mountains. Much of it has already been explored, but I guarantee there's a hill someone hasn't seen or a bug under the ground that nobody has discovered. And all of us get to decide what kind of scientist we want to be. Are you the person that finds the new overlook? Are you the person who digs into the dirt and finds the bugs? Are you the person who surveys the forest and maps it out? There's so many different scales we can work at so many different things. Everybody can have a really different orientation toward what they do and what impact means.

Lots of people have different opinions about what research is for and what scholarship is for. I tend to think of it in explicitly political terms, because I think everything is political and there's no way around that. It's actually much more of a strong moral position if you recognize the politics you bring to something and then act upon them overtly, as opposed to burying them in rhetoric and pretending that you're neutral. Our world is built around white supremacy and patriarchy, and so most of the work we do will end up exposing that or fighting against it.

Most of the research that we do is either directly in service of some particular vision or it helps us shape our visions, even if it's not advocating for a particular one. I'll give an example. I wrote a paper with one of my former PhD students, Mara Kirdani-Ryan [4, 5]. It was about cultures around neurodiversity in higher-education computer science learning contexts, and all of the nuance that doesn't really get acknowledged when we talk about neurodiversity as some big blanket category. How do you reconcile those tensions where there are some ways in which computer science cultures are built around being autistic, but at the same time are really hostile towards autism in particular ways? That's an interplay that is inherently a political conversation without a particular political goal to it. We're not saying here's how the world should be. We're saying, look at this really complicated thing that should trigger challenging conversations around what it means to make computer science inclusive.

Q: Has there been pushback on your work?

AK: There's a whole continuum of pushback that I get. At one end, there's silence, which is a very explicit message: "I'm going to pretend you didn't say that. I don't wanna have to do that reflection." That's the most passive form that I see. On the other end are death threats. There is a lot in between. I get a lot of senior computer science faculty telling me to be quiet. That's a common kind of standard sexist reaction like, "You're talking too much." There's some pushback that's of the form, "I believe your results, *but* …" An example would be the code.org paper about assessment bias. We showed there's some bias, we showed some mechanisms for detecting the bias. A lot of people responded to that paper by saying things like, "There *should* be differences in people's behavior, and it's not our responsibility as computer scientists to worry about whether that's from society or from identity."

Q: How do you personally deal with that pushback?

AK: Just remembering that my persona out there on the internet that people are responding to actually isn't me. They don't know me, they've never met me, and they're just reaching out saying something. Even if they do know who I am, it's only the trace they've gotten from talking to me for 10 minutes at a conference or something. I try to just give people a lot of grace when they're reaching out and saying terrible things because they don't know who I am.

Q: How do you handle pushback in a public forum?

AK: I don't usually like war metaphors, but I think they're appropriate in this case. I prepare for battles. If I decide that I'm going into the fray, I think about what kinds of energy I have for that, what my goals are, and what kinds of support I have to fall back on if something gets really dicey. I know that I'm not going to win every battle either, right?

One of the things that I really love about computing education and scholarship around education is that there is some baseline sense that everybody is here to learn and grow. And I think that's been really healthy and I see that as a really big strength of ours relative to other fields. It's not everyone and it's not all the time and it's not in every context that they want to learn, but I think there's a good baseline we can build upon: making sure we have a pervasive sense of everybody wanting to learn.

Q: What advice would you give to people who want to make an impact on societal problems?

AK: It's going to depend a lot on where they're coming from and the kinds of changes they want. When I talk to other trans folks in computer science who come to me for guidance and counsel about this, I try to be realistic with them and say, "I don't think that any of us are going to be free or liberated in our lifetimes. We're hopefully going to be a lot more free in our lifetimes, but we're going to be a lot less free in the next decade and it's just going to be a whole bunch of struggle. And it's gonna be harder for us than for a lot of other people." That's just a fact; there's no way around it. A good chunk of our time is going to be doing these things just to survive, and that have nothing to do with our careers. That doesn't mean that we can't come together and make progress; it just means that it's not going to look like much. But progress doesn't happen unless people do that work.

There's a patience that comes with recognizing that if you are in a particular group that is experiencing oppression, we know from history that change isn't going to be fast. I find the least patient folks are cis heterosexual folks who are used to getting what they want quickly and don't understand why change is so hard. That's a case of not having a lot of experience bumping up against a whole bunch of barriers to

getting what you need. Just know that if you join the fight, we'll be doing it together for 20 years. Maybe we'll have some fun along the way.

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