Conversation with a Prominent Propagator: Colleen Lewis

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Improving education in computer science requires that pedagogical innovations propagate beyond the original creators, so that transformative practices become a part of everyday teaching within the larger community of CS educators. However, propagation requires substantial time and energy, as well as intentional planning. The CS education community needs to engage in sustained efforts to explore and implement evidence-based strategies for increasing adoption and sustaining impactful use of transformative practices. To that end, this column represents another installment of our ongoing efforts to capture knowledge within the CS education community by interviewing *prominent propagators*, individuals who have successfully spread educational innovations [1–3].

In this column, we interview Dr. Colleen Lewis. Colleen recently moved from Harvey Mudd College to become a faculty member at the University of Illinois at Urbana-Champaign. Among other projects, she is well-known for her work with CS Teaching Tips [4], an NSF-sponsored project for disseminating effective computer science teaching practices that is highly regarded within the CS education community. Her research seeks to identify effective teaching practices for creating equitable spaces where all students have the opportunity to learn [5–9]. Colleen has received the NCWIT.org Undergraduate Mentoring Award and the AnitaB.org Emerging Leader Award in Honor of Denice Denton.

Below are highlights of the interview, which ran approximately an hour. They have been edited for clarity and style.

Q: So what made you decide to focus on propagation, especially so early in your career?

CL: In grad school while I was TA-ing, I would have these deep insights and I would go to my advisor, Mike Clancy, and I'd be like, “Mike Clancy, I have had the deepest insight into the teaching and learning of computer science.” And I would tell him my deep insight and he'd be like, “Yeah,” and I'd be like, “Wait, you already know?” And this happened over and over and over again. So to some extent, it's a project to try to capture what's in Mike Clancy's head.

I think in general we discount the fact that educators have a lot of accumulated knowledge that might not meet the rigorous definitions for research evidence. We need to do both: we need to do basic research, and we need to get the stuff that's in educators’ heads to other educators, because it can be super useful.

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Q: CS Teaching Tips exists as a website, a Twitter, as sheets that you hand out at conferences, and as rolling suitcases. Can you tell us a little bit about all of the ways that you are disseminating this information out into the world?

CL: People initially told me they were finding the website overwhelming. That's how I started doing the seven tips. It was me synthesizing the stuff on the website that's helpful. That expanded from the one tip sheet or two tip sheets that I started off with. Now, I think I have 12. When I started off, I just had a few of those and so I was like, “I'll bring these to conferences." And I had a booth at the SIGCSE Technical Symposium, and people were just coming and picking up all of them. They would just go through the stack and pick up one of each. So I realized that there's something about paper that people are into. Maybe one in 15 people would be like, “Wait, are these online?” And I'm like, “Oh yeah, they are.” And they're like, “Oh, okay. I don't need them.” I think people know that I'm handing them a piece of paper that's online, but people are really into paper.

I think a really key piece in all of this was I hired a post-bacc, Ari Schlesinger, to help me with the CS Teaching Tips project. And I think some of the pieces fell into place. Ari told me I needed a logo and then two students designed the logo and then Ari told me I needed a Twitter account. And we got hella followers.

Q: How has your dissemination strategy evolved?

CL: The SIGCSE Technical Symposium booths were really tiring to do. I didn't get to go to any sessions, and I just stood in the booth all day. One year that I still had the booth, I had one panel, and at that panel I moved more flyers in seventy-five minutes than I had in the last two days. So that transitioned me to just trying to submit like hella submissions to the SIGCSE Technical Symposium. Now my strategy is to present in every session of the SIGCSE Technical Symposium so that I can have a microphone and say, “Please collect CS Teaching Tips materials in the back.”

I also am on the NCWIT academic advisory committee that plans the Summit. And through that, I ended up developing workshoppy content. And so I started disseminating that workshoppy content. We have the microaggressions game (https://www.csteachingtips.org/cards) and then the teaching practices game that I developed with Phil Conrad.

Q: What is your motivation for doing CS Teaching Tips?

CL: In my elevator pitch, I don't mention the commitment to broadening participation in computing, but from my perspective, why are you doing anything in CS education if it's not about justice? So for me, focusing on pedagogy and effective pedagogy is a matter of justice because more effective pedagogy is going to differentially impact students who are underrepresented in computing. So that's sort of my bridge into it. Right now, I'm really keen on disseminating the microaggressions game. I've got the decks of cards and I'd love it if in every TA training session at every campus they use the microaggressions game or the teaching practices game.

I think the conversations that the cards can encourage are super helpful for getting TA's to recognize opportunities for inclusive teaching practices and for better preparing TAs to be messengers around broadening participation in computing. Like responding when someone says something false and hurtful like, “Oh, it's easier for Black and Latinx students to get internships”. I'm really interested in the extent

to which TAs and TA training can play an important cultural role in our institutions as faculty are harder to shift and grow. It might be way more impactful.

Q: What made you think about audiences like TAs, rather than just CS professors?

CL: I think in terms of who I can have the most impact on. I really want to teach a required class that all grad students have to take where they learn to write diversity and inclusion statements and I try to convince them to care about diversity and inclusion. Because UIUC graduates a lot of people who become faculty, that could be my dissemination strategy for trying to make computer science departments better.

Q: What does successful adoption of CS Teaching Tips look like for you?

CL: I think it's super tricky. Every tip sheet has a three minute video associated with it, and those have been integrated into teacher professional development. I'm really excited when I hear from K-12 teachers who have done a certification course or something like that where they're like, “We watched your teaching tips videos in my course and I found them helpful. Thank you.” I think that integration is success.

Q: Do you have advice for someone else trying to propagate their work?

CL: How does academia work? I think it's all about who you know. If you look at the people who create courses for K-12 teachers, they're all people that I might plausibly have a meal with at the SIGCSE Technical Symposium. The world is pretty small. A strategy I used in grad school was to go to as many workshops as possible. My goal was to be in a room full of under 30 people, like those SIGCSE Technical Symposium workshops or other things where you spend three hours with people. You have this shared experience. I think that was how I made connections and I think that was super important in terms of job searching and in terms of propagation. I think that visibility matters more than it should. I think networking is super, super, super important and it works for me as a personality because I'm super extroverted. So when I'm trying to make new connections, I actually don't feel slimy about it because I'm making new friends.

You asked other ways that I'm disseminating things and I think one of my best innovations is finding pinch points in crowd flow at conferences. One year at the SIGCSE Technical Symposium there was this escalator that everybody had to get on because the snacks were downstairs and all the sessions were upstairs. Escalators are perfect because people are moving slowly enough where you can say, “Tips for teaching computer science!” My other strategy is, before the keynotes, I stand in front of the entrance because people are going to go into the keynote and it's not going to start right away. And then they'll read the paper that I just handed them.

Q: It seems clear that you identified the SIGCSE Technical Symposium as a key part of your dissemination. Is there another way you identify people who would potentially use the teaching tips?

CL: I've been mailing a lot of people the teaching tips. So I went to the meeting for district leaders at the CSforAll summit and asked people “Oh, you're in this state and you train teachers, can I mail you some of these things?” So that's another way of finding people who can help me disseminate them and get these packets in the hands of K-12 teachers.

I think another key piece of this was that Microsoft gave me some money. That's really important because I think having CS Teaching Tips stickers and pens and magnets are an important component. I'm not sure if I could spend NSF money on that.

Q: It sounds like you found physical objects to be really helpful and important for you.

CL: I have this deep sense that just because you build a website doesn't mean anyone's ever going to go to it. I think it isn't realistic. People seem to be excited about the physical objects. Yoshi Kohno gave me his threat-modeling cards for security education. They sat in my office and I didn't forget about his project. I have forgotten about every website anyone's ever told me about, you know? So I think there's power to physicality. One thing I want to do is mail CS Teaching Tips magnets to administrators in every department in the country and be like, "Hey, if there are any metallic objects in common spaces, can you put this up?"

And I think particularly with K-12 teachers, paper matters a lot. I have an edX course teaching Scratch, and I designed the course and videos for use in my teaching and my research. But I really see it as a resource for teachers to see how to scaffold students if they want to make a maze game or a stuff-falling-from-the-screen game. I see teachers as the audience and I need to be able to give them a printed copy—a book or a binder—of the edX course for that to be helpful to them.

Q: Did anything not go the way you planned when you started developing CS Teaching Tips?

CL: We were originally planning on serving novice computer science teachers [who were experienced K-12 teachers] and we did some interviews with them in the first month of the grant. And they were like, "I don't want this website, it's not helpful to me. I want content knowledge. I'm already a teacher, I can figure out the teaching parts. Teach me if statements." I felt like, "This is not going to help you and you're going to hate this." So I shifted my mindset to be like, "Oh, this is not for these new CS teachers."

Q: Your tips were super useful for me when I was not new to CS but new to teaching, and is that the flip that they were not new to teaching but new to CS?

CL: Exactly.

Q: Have you received helpful feedback on CS Teaching Tips?

CL: I will post new tip sheets on Facebook to get feedback before I finalize them. I think there I'm just taking advantage of my professional and personal network where I can get informal feedback to make the tips clearer and better.

I've interviewed or done small focus groups with 150 computer science teachers. I think this was also really helpful for having people know about the project because I was contacting them being like, "I've got this thing." And even if they said "no" to being interviewed, they know about the thing now. And if they did say "yes" to being interviewed, I could pay them 50 bucks, which makes them not hate me. I think it was super fun, I was only emailing people who liked talking about teaching, and I talked to them about teaching for an hour and wrote down what they said and translated that into tips. About 150 current computer science teachers contributed.

Q: Do you have any sense of whether there are tips that are people's favorite or specific tips that people really like?

CL: I don't, not that I know of. In terms of thinking about use, I've got the tip sheets, and the front has the high level description and then the back has my elaboration, and I think that no one ever reads the back. I think maybe the YouTube videos are the things that people like the most. But I still think it's not obvious. I've given a lot of people paper, do you know what I mean? And I can tell you how many pounds of paper I've given people, but it's still not obvious how that has translated into impact. I think it's difficult as a teacher to keep track of that. I was on CS Teaching Tips one time and I found this tip and I was like, "Wow, that's a good idea." Then I clicked on it and I was like, "Oh, I'm the source of this tip." And this tip surprised me, and I had obviously stopped doing it but I would like to do it again. There's some trickiness because teaching is really complicated, and it's hard to say where you are getting ideas from and what's influencing that.

Q: What's been the most rewarding part of doing all this?

The process of developing workshop materials that I think, "Oh yeah, this is pretty solid," and people seem to like it. I find that really satisfying.

Q: What advice do you wish you'd known when you started this project?

Knowing that I needed to have a logo. And I think the other thing that I've been doing is trying to fold other dissemination into this. So thinking about that, that logo might be your dissemination logo for the rest of time. And understanding that you never get to stop disseminating your past projects. Maybe that's not good to tell people, just trick them into it.

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