Panel: Lessons Learned in Propagation

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ABSTRACT

This panel explores experiences and insights from three successful propagators into how others can successfully encourage more widespread use of their innovations. Issues covered include designing for dissemination, techniques for recruiting potential adopters, suggestions for convincing faculty to try an innovation and continue using it, and identifying points of friction and overcoming resistance from administrators, students, and/or peers. These topics are discussed and illustrated with personal experiences and anecdotes from our illustrious panelists.

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1 SUMMARY

For over fifty years, SIGCSE has served as a forum for researchers to discuss their innovations within Computer Science Education. However, techniques for teaching CS continue to be distressingly similar to historical practices; lecture remains the signature pedagogy of Computer Science [5]. If we, as researchers and educators, want to make a concrete change in the practice of teaching, we must focus not only on inventing new and better pedagogies, but also on convincing educators to adopt them.

There is a large body of research on propagating educational innovations; see [14] for a summary. Key ideas are to plan for propagation at the onset of the development by designing for adaptation [2], discussing how the innovation fits with existing theories of learning and practices [6], how it will benefit students [6], preempting student resistance [13], resolving tension with covering material or curriculum sequencing [1], and helping faculty gain department support [3]. Building excitement about the innovation is essential for faculty to overcome barriers [12].

Research suggests that the diffusion of innovations in CS education is strongly influenced by "mavens," highly respected and influential educators who serve as opinion leaders in the CS higher education community [6]. This panel brings together three of these mavens to discuss evidence-based solutions to addressing challenges and encouraging more widespread adoption, as told by those who have lived this experience. This panel is part of a larger effort [14] to promote more awareness and discussion on propagation in the community, so that we plan for it when developing educational innovations.

2 PANEL STRUCTURE

Introduction (5 min): The moderator will state why propagation is important and introduce the panelists.

Panelist Expositions (10 min each): Each panelist will reflect on their choices and circumstances around their innovation that have influenced their propagation success.

Discussion (40 min): The moderator will facilitate the discussion by voicing audience questions posed through virtual chat, and by queuing an un-muting attendees to vocalize their questions directly to panelists. We anticipate that the discussion will touch on some or all of the following topics: designing for propagation; recruitment and messaging; dissemination; identifying and overcoming barriers (administrative, students, peers); funding; ongoing support for adopters; and sustaining use.

3 MICHAEL KÖLLING

Michael Kölling is the Vice Dean for Education of the Faculty of Natural and Mathematical Sciences at King's College London. Michael has started and now leads the BlueJ [9, 10] and Greenfoot [8, 11] projects, which provide simplified Java IDEs aimed at novice programmers.

Statement: The one big lesson I learned spreading BlueJ and Greenfoot is that software alone gets you very little. Even if it's good, just putting software out there doesn't have a great chance of adoption. What actually makes the difference is having teaching material that shows teachers exactly what to do with the software. And having good software out there that helps people and that people want to use is a necessary prerequisite, but it's not sufficient.

Getting the resources to keep the systems alive is challenging. You need to constantly come up with things that are novel enough that they are original research. But at the same time, you also have to manage to not ruin your system by constantly meddling with it.

*Moderator

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4 COLLEEN LEWIS

Colleen Lewis is an Assistant Professor of Computer Science (CS) at the University of Illinois Urbana-Champaign. She was previously the McGregor-Girand Associate Professor of CS at Harvey Mudd College. At the University of California, Berkeley, Lewis completed a PhD in science and mathematics education, an MS in computer science, and a BS in electrical engineering and computer science. Her research seeks to identify and remove barriers to CS learning and understand and optimize CS learning. Lewis curates CSTeachingTips.org, a NSF-sponsored project for disseminating effective CS teaching practices. Lewis has received the NCWIT.org Undergraduate Mentoring Award and the AnitaB.org Emerging Leader Award for her efforts to broaden participation in computing.

Statement: As a graduate TA, every time I shared with my advisor one of my new transformative and groundbreaking insights about teaching CS, he would nod and express slight surprise that I thought my insight was novel. This response made me livid — why hadn't he told me! Later in life, I learned this was pedagogical content knowledge (or PCK), which is knowledge about teaching within a specific domain and is distinct from both content knowledge and more general pedagogical knowledge. When, with NSF funding, I started putting PCK (or "tips") on my website CSTeachingTips.org, I knew that I couldn't assume that providing awesome content would be enough. I tweet out three tips a day on Twitter, develop and "eagerly" distribute top-7 list tip sheets at any CS education conference I can afford to attend, and develop workshops and talks that I try to present broadly. I easily spend twice as much energy disseminating content as I do generating content, and frequently people that I barely know will teasingly groan when they see me at SIGCSE or comment that I am "shameless". Maybe this is the cost of dissemination.

Unfortunately, it is still really difficult to measure changes in teachers' teaching practice or PCK. It is much easier to see impact from my EdX course for Scratch. Views and comments on my exceptionally low budget videos suggests that these resources are actually helpful and they don't involve leaving the comfort of home.

5 LEO PORTER

Leo Porter is an Associate Teaching Professor in the CSE Department at UC San Diego. His research interests include Peer Instruction (PI), predicting student outcomes, faculty adoption, and concept inventories. He's known for his work studying the PI pedagogy and for his recent work developing a Concept Inventory for Basic Data Structures. Dedicated to helping faculty adopt best practices in teaching, he co-leads the annual "New Computer Science Faculty Teaching Workshop" funded, in part, by the NSF. He has received five Best Paper Awards and SIGCSE's 50th Year Anniversary Top Ten Symposium Papers of All Time Award.

Statement: Early in my CS education career, I naively thought that if you publish results showing that a pedagogy (or tool, or curriculum) is better than what is commonly done, faculty would flock to adopt it. I then learned about the work of Charles Henderson on the challenges of faculty adoption and was thrilled to be part of an early workshop by the increasetheimpact.org. Since then, much of my work on PI has shifted from studying efficacy to helping faculty adopt it through extensive one-on-one mentoring, workshops hosted at SIGCSE and CCSC, and teaching it as one of many best practices at the New Computer Science Faculty Teaching Workshop. My personal gauges of success has been (1) seeing faculty I mentored in how to use PI go on to mentor new faculty and (2) seeing the vast majority of folks who adopt PI continue to use it and report enjoying their teaching more.

6 CHRISTOPHER HOVEY (MODERATOR)

Chris is a social scientist at NCWIT and the InfoSci department at the CU Boulder. Chris's work focuses on CS faculty adoption of teaching practices that support diversity and inclusion, and student learning, engagement, and retention. His most recent work reports on the connection between faculty attitudes and pedagogical choices [7], and on mechanisms and motivations for faculty discovery, experimentation, and sustained use of new teaching practices [4–6].

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