by David P. Bunde, *Knox College*,
Zack Butler, *Rochester Institute of Technology*,
Christopher L. Hovey, *University of Colorado Boulder*, and
Cynthia Taylor, *Oberlin College*

Conversation with a Prominent Propagator: Beth Quinn and Stephanie Weber, EngageCSEdu


Beth Quinn


Stephanie Weber

Increasing the widespread use of transformative teaching practices in computer science (CS) undergraduate education requires sustained, intentional planning, and effort. This article is the next installment in our series of interviews with *prominent propagators*: members of the CS education community who have successfully spread pedagogical or curricular innovations. Our goal is to capture knowledge and experiences that others can apply to successfully increase the adoption of their teaching projects.

In this installment, we interview Beth Quinn and Stephanie Weber, the core team at the National Center for Women & Information Technology (NCWIT) in the U.S. responsible for the development of EngageCSEdu. EngageCSEdu is a peer-reviewed collection of computer science course materials that also broaden diversity, equity, and inclusion. Assignments are peer-reviewed for quality, and must feature research-based techniques for engaging all students [9], particularly students from groups underrepresented in computing. In recognition of its importance, EngageCSEdu is now being managed by the ACM as a special project of the ACM Education Board.

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

Q: HOW DID EngageCSEdu GET STARTED?

BQ: I was hired in January 2014 when Google provided funding to NCWIT for a project to improve the retention of women in undergraduate computing. NCWIT and Google convened a group of people from computing, education, and the social sciences to scope this project. NCWIT has a research-based change model for undergraduate education [14], and curriculum and pedagogy are two important aspects. Consensus quickly emerged that intro courses were sticking points for retention and really important to broadening participation in computing. We all agreed, if we could help improve that experience, we could make a difference.

Over an intense two days, we came up with the idea of a repository of high-quality, open access teaching materials for introductory computer science courses. It would be curated for quality and use of research-based engagement practices. Google provided engineering support to actually build the platform.

Q: HOW DID YOU DECIDE WHAT MATERIALS TO INCLUDE?

BQ: We needed some kind of engagement or broadening participation rubric. For any particular assignment, usually you won't find research that demonstrates that it works in terms of engagement. But there is research that suggests that particular *types* of practices lead to engagement and retention. So, if a particular assignment uses those practices, we would predict that it would also engage.

Initially there was a bit of back and forth about what constitutes a successful search experience and what's successful in terms of having a collection of items. We had undergraduates go out and find items and in the span of about six months, we went through 15,000 things. The faculty group—with the help of some advanced students—did a rough assessment of all 15k items. The bar was fairly low at that point because the goal that Google gave us was to launch with more than 2,000 materials. Then, it was decided that for legal reasons we couldn't just pull things into the platform because you'd have to get permission from each author. So, we decided to link to the materials. We launched with almost 2,000 materials, all with linked access.

After launching with this "seeded collection," we moved to getting individual faculty members to submit their materials and to building a cadre of external reviewers.

Q: ONCE YOU LAUNCHED, HOW DID YOU RECRUIT PEOPLE TO REVIEW MATERIALS?

SW: We tapped into NCWIT's networks to begin with. Different active members of the Academic Alliance did a ton of outreach to explain the project and build up why it was important and what the mission was. We got a lot of traction from those who submitted assignments. We encour-

aged a lot of potential authors to review rst, so they could see the whole process and how we evaluated if they did submit. So, there were a ton of emails sent asking people to review things.

We eventually built a system that looked pretty similar to a journal review process: where we could assign people from within the EngageCSEdu platform to do reviews. So, something would be submitted and we would assign reviews to people with that area of expertise. They were used to that system of accepting or declining the review and having a certain amount of time to complete it. But it was a tremendous amount of e ort to get that up and running.

BQ: The other thing you should know is that the platform has been rebuilt at least twice from that initial launch. Google was very generous in providing funding for us to do those redesigns as we rolled it out and realized, "Oh, that doesn't work." Managing the review process was one of those issues.

Q: WHAT DID YOU HAVE TO DO TO SUPPORT USERS, BOTH AUTHORS AND REVIEWERS?

BQ: Stephanie had to do an amazing amount of work. She did a lot of handholding. A lot of instructors just simply don't know how to write materials so that other people can use them. Stephanie's background in science education really came in handy in terms of saying, "Let's talk about how you're describing this, and what kind of information needs to be there for someone else to be able to use this material."

Q: HOW DID YOU GET THE WORD OUT ABOUT EngageCSEdu ?

BQ: That rst year, the core GoogleNCWIT team did a SIGCSE presentation and an *Inroads* article [5,6]. The SIGCSE presentation was really well attended, but it was hard because we were still calling it a repository and people were saying, "We do not need another repository. That one failed, why is this one not going to fail?" But we talked about peer review, we talked about making submissions. We did a demonstration on the exhibit hall oor. Later, we started having our own booth at SIGCSE. We put a ton of e ort into outreach. **SW:** We did a lot of developing our own brand and recognition. We often had

authors and reviewers with us at the happened was hardly anybody signed in.

SIGCSE booth because people wanted to The only reason to have an account and

hear from their peers, answering questions sign in is if you're a reviewer or an author.

such as, "How are you using this?", "Are you Even people with accounts

don't log in if

submitting materials?", and "What's the val- they're just looking for materials.

ue?" So, it was a lot of getting the name out

there and building that recognition and trust

Q: WHAT DO YOU CONSIDER TO BE

within not just the post-secondary commu-

SUCCESS?

nity, but also the high school community.

We

BQ: One question from the beginning is

did a similar booth at the Computer Science how big a collection does it have to be

Teachers Association (CSTA) one year. to be useful? What level of quality does

BQ: In the last couple of years at the SIGCSE there need to be? Our strategy for initially

booth, I started to see people come back seeding the collection by

linking out to

again and again, to just hang out. It seemed materials caused huge problems. Links

like there was a community coalescing were going dead every semester because

around this thing, this brand, this idea. people would move their materials. Also,

initial materials were assessed but then

Q: TO WHAT DEGREE IS EngageCS

Edu the author might change them. This was a

USED BY K 12 EDUCATORS? HOW DO YOU constant conversation that Stephanie and I

TELL WHO IS ACCESSING MATERIALS? had, and with our advisory board. Where's

BQ: I think at one point 20% of our reg- that balance between a lot of materials and

istered users were

high school or middle quality and how much control over quality

school teachers. That's with a big caveat, do we want to have? And we did look to

because you don't have to register at the the experiences of other repositories to

site to get access to the materials. That was think about what constitutes success. What

another tension that we had: we

wanted we came to understand from our users is

it to be easy to use! If someone was like, “I that quality matters more than quantity.

really need something to teach recursion I know I’m not quite answering your

tomorrow,” they could get on, nd an assign- question about what counts as success,

ment, and use it. The site doesn’t require a because it’s

so hard. I want people to know

login to access the materi als, so a proble m about it. I want people to use it and I want

that contin ues to vex the system is that we people to trust it. So, that's the short answer

really do not know who our users are. to the questio n: Users have to trust it, or

SW: We did have a feature for a while they won't use it. And nding

quality materi-

where people could rate and comment on als, even if there are fewer of them, matters.

the lessons. We actually had to build in **SW:** I think another goal of the project was

some layers of security, because some- to have people see NCWIT resources and

times we would get spammed. the Engagement Practice Framework [9].

BQ: You had to sign in to do that. What We worked hard to make those concise

and really tangible. When people went to a resource, they didn't just read the lesson and see how they could implement it in their classroom. Underneath the resource, they were also given engagement practices, like building community with students. They could click on an engagement practice and get a description of what that meant, with research to back it, and they got linked to NCWIT resources. They could read about how the setup of your classroom could be either encouraging or discouraging women from continuing in your class or different Top 10 Tips, things like that. So, I also looked at that as success in that we were drawing people to our website and our organization's mission.

BQ: Yeah. As Lecia Barker [senior research scientist at NCWIT] put it early on, "it's stealth teaching." That is, they come for teaching materials, but they learn something about broadening participation in the process.

Q: HOW DID YOUR DEFINITION SHIFT WHEN YOU MOVED EngageCSEdu TO A SUBMISSION-MODEL?

BQ: It has to have a certain cachet or people won't take the time to submit. That was another big question: How do you incentivize busy faculty to submit materials? If they're not getting anything back from it, they're likely not going to do it. There are some people with big hearts who will do it just because they believe in it, but most people need to be incentivized. And how do you incentivize a faculty member? It's got to be something that has a reputation for quality, that it's important to be in. So, we kept moving more and more toward peer review until the logical outcome was having a structure like a journal. We needed people who were respected in the community to be the editors-in-chief, an editorial board, and a review process with the look and feel of a journal article review process. And we needed to be really picky, so that's what we did. We raised the bar for quality and got rid of a lot of things from the original seeded collection. So, of course, the number of items in the collection just kept dropping. And, oh my gosh, is that a sign of failure or is that a sign of success, that the number of things in the collection goes down?

Q: DID YOU EVER HAVE TO REACH OUT TO NEW PEOPLE TO PARTICIPATE?

SW: We had a group that always reviewed because they were really dedicated to the mission. But we were constantly asking new people to review; if someone had interest in broadening participation in computing, they probably heard from me or Beth.

BQ: The other thing—and this was totally happenstance—I was trying to figure out if we wanted to advertise in *Inroads*, and I ended up talking to Laurie King and Mark Bailey who were the co-editors at the time. Before I knew it, I was writing a column. The first couple of columns I was trying to just get the word out [11,13]. And then I hit on this idea of doing interviews with authors: I had one where it was someone who is a POGIL expert and somebody who was newly trying POGIL [4], and Beth Simon on Peer Instruction [12]. These articles were peer reviewed and were pretty well-received. It was so much fun and so much work! Just having that in front of the SIGCSE community through *Inroads* every quarter helped with name recognition so much. The current editors of CSEngageEdu, Briana Morrison and Michelle Craig, have continued the column (e.g., [7,8]).

Q: DO YOU FEEL LIKE YOU HAVE A SYMBIOTIC RELATIONSHIP WITH THE PROJECTS YOU ADD TO EngageCSEdu IN HELPING THEM TO PROPAGATE?

BQ: That's one of the things that we focused on. I don't remember how we hit on it, maybe it was POGIL when Helen Hu and Clif Kussmaul came to us. We realized, "Oh, so you have this NSF funded project and

it's going to develop curriculum, and you have the project website, but what happens to it? How do people find it?" That is a perennial problem. So, we worked really hard to find those curriculum projects.

Sometimes people wanted to give us the whole curriculum. We're like, no, to maintain searchability we curate individual assignments, homework, and projects. So, give us your best materials, and then those materials on EngageCSEdu will point to your website. People will come to EngageCSEdu, they'll find your POGIL exercise [16] and then the link to your project site [1]. They find a Computational Creativity activity [10,15]. They'll find Earsketch [2,3]. We do the work of getting the name out. Everybody knows to come to EngageCSEdu: they look for something, they find one exercise, then they find the link to all of your curriculum. So, EngageCSEdu has also ended up being a dissemination mechanism for grants that developed engaging materials for intro CS. That's been successful. I'm really proud that EngageCSEdu can offer that service to the research—and teaching—community.

Q: IF SOMEONE WAS INTERESTED IN TRYING TO GET THEIR TEACHING PRACTICES OUT THERE, WHAT ADVICE WOULD YOU GIVE THEM?

SW: SIGCSE was really integral for us. We also went to the CSTA annual meeting. I think it helps to go to those types of conferences where people really are talking about teaching practices.

BQ: We plugged into the existing incentive structure of faculty at universities. We had a harder time with high school because we never quite figured out what the right incentive structure was for them.

SW: As a former high school teacher, I know that educators get inundated with new practices all the time, so you really want to introduce your practice in a way that isn't extra work for them. You have to sell the idea that it helps them do their job better or makes their job easier.

BQ: For sure! I think the biggest thing with any new product is marketing and getting name recognition. If you're only talking to a small group of people, then when funding runs out, so do the conversations—unless it's going to live on somewhere.

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You also need infrastructure. You need backbone organizations like NCWIT and ACM. EngageCSEdu was developed by NCWIT, which has wide networks and expertise in broadening participation. Then we worked to get it to a place of sustainability by working with the ACM Education Board to adopt it as a project [7,8]. If you want to get your new teaching curricula or practice out there, you have to plug into existing infrastructure and incentive structures. And then you have to build ways for people to have a community around it. ❖

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David P. Bunde
Knox College
2 E. South St
Galesburg, Illinois 61401 USA
dbunde@knox.edu

Zack Butler
Rochester Institute of Technology
Rochester, NY 14623 USA
zjb@cs.rit.edu

Christopher L. Hovey
University of Colorado Boulder
1045 18th Street, UCB 315
Boulder, CO 80309
hoveyc@colorado.edu

Cynthia Taylor
Oberlin College
10 N Professor St
Oberlin OH, 44074
ctaylor@oberlin.edu

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