SIGCSE *Bulletin*
Vol. 53, No. 4

Contents

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SIGCSE News in Brief

Welcome to the fourth issue of the SIGCSE *Bulletin* in 2021.

At many academic institutions, including mine, students and educators are rediscovering the joy of being together in person. At the same time, it is impossible to ignore the lingering tensions precipitated by the pandemic. Students entered my ethics course this term with divergent views on the University's response to COVID-19; face-to-face again, they articulated their views passionately in class. Although it was not the most comfortable of discussions, it did set up a fruitful discourse on the interplay between morality, ethics, and policy. Still, I worried that the emotional undercurrents could derail the course. To my pleasant surprise, the contrary has proved true; as we have turned to ethical concerns in the computing arena, the level of participation and the thoughtfulness of the discussion have exceeded previous years. For well over a year, our students have been engaged

in a struggle that is both shared and deeply personal. I am hopeful that this struggle has strengthened an awareness among our students of their moral agency – a sense that *things matter*, and that *taking a position* is mandatory, not optional.

In this issue of the *Bulletin,* Diane Horton and Meghan Allen describe a unique opportunity for new and aspiring educators in computer science to prepare for their careers: a pre-symposium workshop associated with SIGCSE 2022. Brett Becker and Keith Quille give us a preview of ITiCSE 2022, which will be held in Dublin, Ireland. (A full call for ITiCSE participation will appear in the next issue of the Bulletin.)

Continuing our regular column on equity issues in computer science education, Laura Dillon of Michigan State University and Linda Ott of Michigan Technological University reflect on their efforts to increase the representation of women in computing.

Finally, the Member Spotlight in this issue shines upon Brett Becker, who describes some of the many computer science education initiatives that he is involved in and gives his perspective on emerging challenges and opportunities in the field.

We hope you enjoy this issue of the *Bulletin*.

Upcoming Dates and Deadlines

Conference	Location	Dates	Full Paper Submission Deadline
Koli Calling 2021	Online	November 18-21, 2021	(Passed)
SIGCSE TS 2022	Providence, Rhode Island, USA	March 2-5, 2022	(Passed)
ITiCSE 2022	Dublin, Ireland	July 8-13, 2022	TBD
ICER 2022	Lugano, Switzerland	TBD	TBD

Other conferences operate in cooperation with SIGCSE and are posted on the SIGCSE web site at sigcse.org/events/incoop.html.

Professional Development Workshop for New and Aspiring Educators at SIGCSE 2022: Call for Participation
By Diane Horton and Meghan Allen

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A successful career as an educator involves more than a deep understanding of a research area. Even so, many new CS educators experience relatively little training *as educators* – and face more questions than answers, e.g., How do I find a career path and institution that are right for me? What strategies can I use during the job search and interviewing process to achieve my goals? What tips could help me organize a course, scaffold engaging experiences, and build lasting relationships with students? What practical steps can I take to support equity, diversity, and inclusion in my work?

The Professional Development Workshop for New and Aspiring Educators is a pre-symposium event at SIGCSE 2022 that, through presentations, discussions, and small-group community building, will tackle these questions. The workshop is designed to assist aspiring and early-career educators in exploring the non-research facets of an academic career. It will run on March 2, 2022 in Providence, Rhode Island, USA from 9am to 5pm, and is open to postdocs and graduate students in any year who are considering careers in academia, as well as pre-tenure faculty members and new teaching-track faculty seeking guidance and/or networking support. This workshop is one of several career-focused, SIGCSE-affiliated events at the 2022 Technical Symposium that have served more than 200 educators over the past decade.

Join us for the 2022 Professional Development Workshop for New and Aspiring Educators! More information and application instructions are available at the workshop website which also contains a tentative workshop schedule, links to prior workshops, and a repository of career-mentoring advice collected from previous years.

We thank the SIGCSE Board for its generous support of the 2022 workshop, which is free for all participants. Some travel support is available, with preference given to graduate students. Seats are limited, so interested graduate students, postdocs, and pre-tenure faculty are encouraged to apply early.

ITiCSE 2022 Preview
By Brett Becker and Keith Quille

The 27th annual ACM Conference on Innovation and Technology in Computer Science Education (ITiCSE) will take place in Dublin, Ireland, hosted by University College Dublin (UCD), with support from the Technological University of Dublin (TU Dublin).

Home to four of Ireland's nine universities, Dublin is an ancient and modern city all in one. Settled thousands of years ago, the city has been inhabited by Gaels, Vikings, and many other peoples. Today it is inhabited by employees of almost every computing and tech company you can think of including Adobe, Amazon, Apple, Dell, Facebook, Google, IBM, Intel, Microsoft, Oracle, Stripe, Twitter, and many, many more. Several of these Irish offices are second in size only to their US counterparts. Here are a few fun facts about Ireland. For more than two decades Ireland has been consistently ranked as the 1st or 2nd largest software exporter in the world. CoderDojo was founded in Ireland, and it is also

home to the second largest SIGCSE local chapter!

Ireland is a relatively small island. It is a little smaller than Portugal and the US state of Indiana, and a little bigger than the main islands of Sri Lanka and Tasmania. It is home to numerous UNESCO world heritage sites and national parks and has a surprising diversity of rivers, mountains, outlying islands, and wilderness - all within a few hours' drive from Dublin. Only 30-60 minutes from Dublin you could easily find more sheep and cows than people.

Some more experienced SIGCSE members might remember that the 3rd ITiCSE was also held in Dublin in 1998. The 2022 return will be held July 8-13, 2022, with Working Groups taking place July 8-10 and the main conference taking place July 11-13. This is a new format following last year's community consultation whereby working group members have three full days to work prior to the main conference, which they can then attend.

The ITiCSE Steering Committee sees physical presence as a top priority. Looking ahead to 2022 we aim to accommodate anyone who can travel to visit Dublin and ITiCSE in person. Rooms are booked! However, not everyone will be able to travel for a multitude of reasons, and we want everyone to be able to join. Therefore ITiCSE 2022 will offer remote participation. Details will become available as the date draws nearer and more concrete plans can be confidently put in place. Please visit iticse.acm.org/2022 for updates over the coming weeks and months. The call for participation is being finalised and will follow a similar schedule to recent years, so start writing! We will share the call for participation on the website and send it to the SIGCSE mailing list, so please be on the lookout. *Táimid ag tnúth bualadh libh* (We're looking forward to meeting you).

Dalkey Island from Killiney Hill, Co. Dublin, Ireland
photo credit: Brett Becker

As a CS Educator, How Do You Think We Can Address Inequity Issues That Exist in the Field?
By Jeffrey Miller and Charles Wallace, SIGCSE *Bulletin* Co-editors, Laura Dillon, Linda Ott

We have been inviting CS education researchers to offer brief remarks to spark discussion and provide ideas for actions we can all take to address inequity issues.

Laura Dillon (Professor Emeritus, Computer Science & Engineering, Michigan State University) and **Linda Ott** (Professor and Chair, Computer Science, Michigan Technological University) have been tireless in their efforts to increase the representation of women in computing. They have been among the leaders of the Michigan Celebration of Women in Computing since its founding in 2007, and they have engaged their institutions in numerous projects in collaboration with the National Center for Women & Information Technology (NCWIT) and the Grace Hopper Celebration of Women in Computing. They have established and led student organizations for women in computing at their institutions. In addition, Laura led a collaboration with the US Peace Corps and IBM to offer Techkobwa, a technology camp for secondary school girls and teachers in Rwanda for three summers. She also created the Computational Thinking Lab at

MSU to boost confidence, competency, and resilience of students in MSU's introductory programming course. Linda founded a Women in Computer Science summer program, which is a weeklong residential program for high school girls. Linda was also a co-PI on two Google ExploreCSR grants to encourage underrepresented undergraduate students to pursue graduate studies.

For our regular feature on equity in CS, *Bulletin* co-editor Charles Wallace recently had a conversation with the two of them; the following is an excerpt of that conversation.

Q: Where would you say the most important focus area is right now in terms of encouraging more girls and women to consider CS?

Laura: At the pre-college level, in exposing all children to the wonders of computing and getting them to envision themselves as technology creators. It's too late to get buy-in if it's completely foreign to them when they start college. They worry that they are already at a disadvantage and that they probably wouldn't like it anyway.

Linda: That reminds me of a story from a couple of weeks ago. We have an open house for prospective high school students, where CS and the other departments each have a table in a big ballroom, and students can go around and talk to different departments. And I had one girl kind of wandering around near my table, so I started talking to her and asked if she was interested in CS. She said, oh no, no, no, no, and I said "Oh, why not? Do you know what it is?" She said "No – I don't know what it is, but I'm sure I don't want it." [Laughs] Whereas, if they have the exposure prior to their senior year in high school, at least they can say yes or no, with some basis of understanding.

Laura: Right. It's not that elementary students should be studying computer science as a class, but they should be exposed to computational concepts as they are learning math and science and other topics. They should be seeing computation used across the curriculum in elementary school, and then moving on to taking actual CS classes and joining programming clubs in high school. The push by organizations like code.org to introduce computing to kids already seems to be having an impact. A number of high school teachers in Michigan are having tremendous success in attracting girls to their programs. For example, the starting CS class at KAMSC [Kalamazoo Area Mathematics and Science Center] had more than 50% girls this year. The excitement of the girls at MSU's High School Programming competition is fun to see. We encourage teachers to send some all-girl teams and allow them to send multiple teams only if the whole group of competitors they send is sufficiently diverse.

Linda: Remember all of those things we used to say, like girls didn't like competitions. Well actually, some of them do!

Laura: Oh absolutely, and they love nothing more than to show up the guys, right?

Q: At the college level, what are the most valuable things we can do to retain women who are interested in CS?

Linda: Help them continue to see that what they're studying is going to lead to a rewarding career. I still see many students, particularly women, saying "Well, I'm not sure I want to do this for the rest of my life." You know, depending on individuals, certain courses will turn off certain groups of students – We need to help them see a long-term goal that is important to them and that they need to keep pushing, that it's worth pushing through whatever courses they don't like to get to their goal.

Laura: Yes, and giving them fun, engaging, and relevant assignments in those beginning courses. Assignments that aren't just toy exercises – giving them lots of scaffolding if necessary so

they can make headway on a complex program and come away feeling, "Oh, this does something impressive – coding allows me to create something relevant to my and other people's lives." It's really important to show the relevancy of what they can do with coding early on, not wait until they get into their junior and senior years.

At MSU, we switched from using C++ to Python for the first programming course precisely for this reason. Students can very quickly create programs using standard Python libraries that are fun and exciting and have compelling applications, whereas it takes quite a bit longer to get to this point with C++.

Linda: In some ways, I'm wondering about reinforcing the relevance, how much of an issue that is nowadays, because software is now so prevalent in their lives. You know, I think that even ten years ago students didn't have a good sense of where software was used – and now it's smack in their face all day long. And many more are aware of how much software is a part of their lives.

Laura: That's true – but the complexity can be intimidating – the *feeling* that "It's so complex, I could never create this." Whereas, if they have seen solutions to real problems broken down into small pieces and described so they can understand how all the pieces fit together early on, they begin to realize that they are capable of understanding even complex software.

Growth mindset is important. And so is resilience – getting them to understand that they're going to hit some walls, and will have to just keep plugging away at it. Math taught me that – scribble down what you can understand in class, then spend a lot of time filling in the missing pieces when you get home. It doesn't come all at once; but it gradually makes sense if you keep working on it. As Linda pointed out, however, it's hard to stay motivated if you don't know that the end goal is worth it.

Q: What are your hopes for the future of women in computing?

Laura: The women in computing groups that we've had for many years, for students and faculty, have been tremendous for our department and our women. I'd like to see that engagement extend into the many other groups that aren't gender specific.

Linda: Yes, and with greater numbers of women in CS, I think there's opportunity for greater awareness and acceptance of different kinds of diversity. We're now seeing and acknowledging different kinds of diversity in our department.

Laura: Right, we are seeing new awareness of issues faced by students who identify as non-binary and with other historically underrepresented groups. I think that has the opportunity to make all students – not just women – feel more accepted.

Linda: Awareness of other minority groups makes women feel that they are not the only minority. And the increase in women has made it easier for other groups to feel they have a place. When you have better representation of women, non-binary students and other demographic groups can see computing is no longer done just by one big homogenous group.

Member Spotlight
By Jeffrey Miller and Charles Wallace, SIGCSE *Bulletin* Co-editors, Brett Becker

In this feature of the *Bulletin*, we highlight members of the SIGCSE community. In this issue, *Bulletin* co-editor Charles Wallace interviewed Dr. Brett Becker, Assistant Professor in the School of Computer Science at University College Dublin (UCD) in Ireland. Brett double-majored in Computer Science and Physics at Drew University in New Jersey. He then moved to Ireland and completed an M.Sc. in Computational Science and a Ph.D. in

Computer Science (Heterogeneous Parallel Computing) at UCD. Since then, he has completed three postgraduate qualifications in Teaching & Learning including an MA in Higher Education. His research interests include the psychology and other human factors of learning programming, including how novices interact with programming languages and environments. In 2020, he received a Teaching and Learning Research Fellowship from the Irish National Forum for the Enhancement of Teaching and Learning in Higher Education – the highest individual national distinction the sector offers to those teaching in higher education. Brett is active in all four SIGCSE conferences including serving as Chair of the CompEd Steering Committee and Co-chairing ITiCSE 2022 in Dublin next summer. He has co-authored several award-winning papers including best computing education research papers (SIGCSE Technical Symposium 2019, 2021) and best reviewed paper (ICER 2020). Brett is chair of the Ireland ACM SIGCSE Chapter and recently co-authored a textbook aligned with the Irish national second-level Computer Science curriculum.

Brett Becker
photo credit: Catherine Mooney

How did you first get involved with the CS education community?

I went to the SIGCSE Technical Symposium in 2016 but had limited time and didn't know anyone beforehand. I thoroughly enjoyed it but didn't have the chance to build many relationships. That changed dramatically when I joined a working group at ITiCSE 2016. By the time I left Peru I knew SIGCSE was for me. I was really lucky – that working group had a great mix of seasoned members and newcomers. Out of the nine others in that working group, I went on to collaborate with all but a few of them and count several as friends to this day. After that I had a few serendipitous meetings with other people in the community including a great weekend in Shanghai where I was blessed with a lot of time to talk to people who knew the community much better than I did. SIGCSE has enabled me to do what I'm passionate about, and I feel a strong sense of affinity with many people in SIGCSE.

Can you describe some of the ways you have been involved in developing and enhancing computer science education?

I am passionate about geographical diversity. I am currently the Global Liaison for the Symposium, and I established the SIGCSE Technical Symposium Buddy Program in 2020. In 2021 about 300 people took part. The premise is that those who consider themselves to be less experienced are paired up with those who consider themselves to be more experienced. Before the pandemic this would have included some emailing, then at the conference, the less-experienced attendee would meet the more-experienced and through them build new networks of people and find out how things work. We've had to adapt things to virtual conferences, but all signs point towards it being very beneficial. This is similar in a way to my work with CompEd, the mission of which is to bring the SIGCSE conference experience to locations that are very rarely (or not at all) served by the other three SIGCSE conferences. The pandemic has slowed us down a bit, but we had a great first conference in China in 2019 and we are looking forward to holding CompEd in India as soon as possible.

I'm very interested in communities and where computing meets people. I am finishing up a

SIGCSE Special Project Grant where we interviewed several dozen people who either have a fairly traditional computing education but are no longer working in computing directly, or vice-versa – they came to study or work in computing from a non-computing background. These people have very interesting stories that both demonstrate and can help broaden participation and inspire us all. It is amazing how all types of diversity appear when you focus on career diversity. The launch of that project will be in the coming months and is housed at computingcrossroads.org.

I'm also on the CS202X Steering Committee who are charged with updating the 2013 ACM/IEEE Computer Science Curricula. There I'm chairing the Society, Ethics, and Professionalism subcommittee. It's super fascinating work and really exciting helping to shape computing education for the next decade or so. It's a little scary too!

Where do you think computer science education is headed in the next 5-10 years?

I think that Artificial Intelligence stands to be an internet-scale driver of change. The internet ushered in many things, including a resource shift from books and other analog resources, often with relatively little or very narrow information, to digital materials often with too much information. AI is poised to advance this further, making information available in terms of type, format and quantity needed, with great precision. Let's look at programming as a case in point. How did the internet change programming education? It changed where learning happened, and it introduced new resources with a lot more information volume and types, like what is found on YouTube, Stack Overflow and GitHub. AI can take this to the next level. Programming, and how it happens, and how it is learned, will change. Humans won't need to search through mountains of information themselves – AI tools will do that for us, presenting (only) exactly what is needed

at the time. AI-powered tools will also likely fundamentally alter how programs are constructed and tested. Recently I've been experimenting with a third-party software tool that can write code when provided with nothing more than a written problem description in sentence form. It's pretty mind blowing. Of course, many other facets of computing education – in fact all of education – will be changed by similar tools, not just programming.

What do you think are the biggest challenges facing the community?

To be a little abstract, one of the biggest challenges is growth. It is a great problem to have though. Computing technologies, products (hardware and software), and the people that design, build, test, and understand them are in increasing demand. Computing is so essential to so many industries and endeavors today, and both the depth and scope is increasing continuously. This is great for opportunity – but it is also a big challenge. How will we teach increasing numbers of students, a rapidly growing number of whom are learning aspects of computing, but in the context of other non-computing disciplines? How will that computing knowledge make these students the best possible artists, chemists, doctors, engineers, lawyers, musicians, and zoologists? How can we help them help their future customers, patients, and clients? We are increasingly aware of the societal, ethical, and professional demands of the tools we use and the things we teach, but largely we focus on these with a computing-centric view. What about the other way around? What changes in the picture for an artist at the overlap of art and computing, who has an art-centric view? The pace of technological change is also a challenge. It's scary how fast things are developing.

What are the biggest challenges for diversity, equity, and inclusion in CS education today? And what can CS educators do to help encourage diversity?

I think one of the biggest challenges for diversity, equity and inclusion is the very nature of the present. We are in a landscape where we have long-standing, persistent, often historically and culturally rooted issues and factors at work. This present is also being continuously re-shaped by a future that is changing faster than ever in many ways. A challenge I often struggle with, which I believe many others share, is: what can one person do today that will help overcome such big, persistent, societal injustices and inequalities? What can we as CS educators do to help?

Probably the first thing is telling ourselves that we can help – one educator can make a difference. What we do in class – how we talk – how we act – how we present ourselves – and the picture of the world we present to students – for example, the examples we use – all matter. These so-called little things can do good, but can also possibly do harm. So do good!

All educators can help foster a positive sense of belonging among their current students, as well as their colleagues. Get to know what they think is holding them back, what they think they need, not just to succeed academically, but socially, professionally, in the bigger context. There is a lot of focus on more diverse intakes, but long term we don't just need more diverse intakes. We need graduates that represent all of the diversity of today's global society, that are also happy, fulfilled, and successful. The sense of belonging that all our students have today is super important not just to them, but for tomorrow's students too.

Lately I've also been working on metacognition and the role it can play in learning to program. A little bit of conscious metacognition – step back – big picture – self-awareness – is probably a solid first step in terms of helping diversity, equity, and inclusion. One of the lessons I learned was that it's not enough to reflect on how I present myself – I should try to reflect on how accurate my reflection of myself is, and how that reflection might be perceived differently by different people.

What do you enjoy doing when you are not working?

I swim in the Irish sea every week year-round. It's not the Caribbean, but it is exhilarating! I also volunteer for a medical transport service that moves medical samples, blood, breast milk, and other things between hospitals, labs, donors, patients, etc., mostly using motorcycles. It's really interesting work full of late nights which I like. What else… I have developed a penchant for the game of snooker since moving to Ireland and try to play when I can but finding tables these days is hard. Real estate is too expensive for billiard tables. I also really enjoy working on mechanical things. I drive an old car and admit I get a little excited when it acts up. I can't resist solving a mechanical mystery. My partner and I also travel a good bit. We do a lot of our teaching in China, and it has really informed a lot of my more recent views on teaching, inclusion, and the world in general.