SIGCSE Annual Report
July 2019 - June 2020

Submitted by: Adrienne Decker, SIGCSE Chair

The scope of SIGCSE is to provide a global forum for educators to discuss research and practice related to the learning, and teaching of computing, the development, implementation, and evaluation of computing programs, curricula, and courses at all education levels, as well as broad participation, educational technology, instructional spaces, and other elements of teaching and pedagogy related to computing.

Awards

The 2020 SIGCSE Award for Outstanding Contribution to Computer Science Education was presented to Lauri Malmi from Aalto University in Finland. His work focuses on advanced learning environments for programming education. He has created a strong network of collaboration among universities in Finland to advance the work of the research and tools being done in introductory programming. He has chaired SIGCSE Doctoral Consortia and was a chair of ICER and has contributed to the creation and growth of Koli Calling.

The 2020 SIGCSE Award for Lifetime Service to the Computer Science Education Community was given to Alison Clear from Eastern Institute of Technology Auckland in New Zealand. Alison's work on curriculum development has spanned 30 years beginning with leading the development of the national computing curriculum in New Zealand in 1986. She has served the SIGCSE organization as a board member for 9 years, and as a conference chair to both ITiCSE and ICER. Currently, she is chairing the joint ACM and IEEE-CS effort to produce the Computing Curriulum 2020 document.

The SIGCSE Board started a new award in 2020, the SIGCSE Test of Time award. The first recepient of this award was "An object-oriented development environment for first programming course" authored by Michael Kolling and John Rosenberg. The paper was originally presented at SIGCSE Technical Symposium on Computer Science Education in 1996. This paper was part of the first wave of papers that built the movement to the use of object-orientation in teaching introductory programming. The Blue environment introduced in the paper evolved into the BlueJ environment that has had over 20 million users to date and has created a research environment for 12 separate research groups using Blackbox which collects user interaction data from BlueJ.

Significant papers on new areas that were published in proceedings

The 2019 ACM International Computing Education Research Conference (ICER 2019) had two best paper awards.

The Chair's Award is selected by the organizing committee and was presented jointly to Yasmin Kafai, Chris Proctor, and Debora Lui for "From Theory Bias to Theory Dialogue: Embracing Cognitive, Situated, and Critical Framings of Computational Thinking in K-12 CS Education" and to Lauri Malmi, Judy Sheard, and Paivi Kinnunen for "Computing Education Theories: What Are They and How Are They Used?"

The John Henry Award is selected by the conference attendees and was presented to Lauren Margulieux for "Spatial Encoding Strategy Theory: The Relationship between Spatial Skill and STEM Achievement."

In 2020, the SIGCSE Technical Symposium gave best paper awards for three different categories of papers. In each category the top three papers were identified.

In the Experience Report and Tools category the Best paper was Applying NCWIT Protocol to Broaden Participation in Computing: A Case Study of CS@Mines" by Tracy Camp, Christine Liebe, Michelle Slattery. The Second Best paper was "A Comparison of Two Pair Programming Configurations for Upper Elementary Students" by Jennifer Tsan, Jessica Vandenberg, Zarifa Zakaria, Joseph B. Wiggins, Alexander R. Webber, Amanda Bradbury, Collin Lynch, Eric N. Wiebe, Kristy Elizabeth Boyer. The Third Best paper was "Reviewing CS1 Materials through a Collaborative Software Engineering Exercise: An Experience Report" by Jessica Young Schmidt.

In the Curricula Initiatives category the Best paper was "Design Principles behind Beauty and Joy of Computing" by Paul Goldenberg, June Mark, Brian Harvey, Al Cuoco, Mary Fries. The Second Best paper was "Teaching Autonomous Systems at 1/10th-scale: Design of the F1/10 Racecar, Simulators and Curriculum" by Abhijeet Agnihotri, Matthew O'Kelly, Houssam Abbas, Rahul Mangharam. The Third Best paper was "Creating a Balanced Data Science Program" by Joel C. Adams.

In CS Education Research category, the best paper was "Competitive Enrollment Policies in Computing Departments Negatively Predict First-Year Students' Sense of Belonging, Self-Efficacy, and Perception of Department" by An Nguyen, Colleen M. Lewis. The Second Best paper was "Dual-Modality Instruction and Learning: A Case Study in CS1" by Jeremiah Blanchard, Christina Gardner-McCune, Lisa Anthony. The Third Best paper was "What Are Cybersecurity Education Papers About? A Systematic Literature Review of SIGCSE and ITiCSE Conferences" by Valdemar Svabensky, Jan Vykopal, Pavel Celeda.

There was a single Best Paper Award given at ITiCSE 2020. It was awarded to Kirsten Mork, John Wilcox, and Zoe Wood for "Creative Choice in Fifth Grade Computing Curriculum." The ACM Europe Council sponsored the award and presented the winner with a certificate and a 1000 Euro cheque.

The SIGCSE Board created an award to honor the 25th anniversary of ITiCSE (celebrated June 17-18 virtually) that would honor the Top 5 ITiCSE Papers and Top 5 Working Group Reports from the first 24 proceedings of ITiCSE.

The top 5 papers were (ordered by date):

- 1996, "Active Learning and Its Use in Computer Science" by Jeffrey J. McConnell.
- 2004, "Self-efficacy and mental models in learning to program" by Vennila Ramalingam, Deborah LaBelle, Susan Wiedenbeck.
- 2005, A study of the difficulties of novice programmers by Essi Lahtinen, Kirsti Ala-Mutka, Hannu-Matti Järvinen.

- 2006, "Not seeing the forest for the trees: novice programmers and the SOLO taxonomy" by Raymond Lister, Beth Simon, Errol Thompson, Jacqueline Whalley, Christine Prasad.
- 2014, "Failure rates in introductory programming revisited by Christopher Watson, Frederick W.B. Li.

From these, the paper "Self-efficacy and mental models in learning to program" by Vennila Ramalingam, Deborah LaBelle, and Susan Wiedenbeck was chosen as the Top Paper.

The top 5 working group reports were (ordered by date):

- 2001, "A multi-national, multi-institutional study of assessment of programming skills of first-year CS students" by Michael McCracken, Vicki Almstrum, Danny Diaz, Mark Guzdial, Dianne Hagan, Yifat Ben-David Kolikant, Cary Laxer, Lynda Thomas, Ian Utting, Tadeusz Wilusz.
- 2002, "Exploring the role of visualization and engagement in computer science education" by Thomas L. Naps, Guido Rößling, Vicki Almstrum, Wanda Dann, Rudolf Fleischer, Chris Hundhausen, Ari Korhonen, Lauri Malmi, Myles McNally, Susan Rodger, J. Ángel Velázquez-Iturbide.
- 2004, "A multi-national study of reading and tracing skills in novice programmers" by Raymond Lister, Elizabeth S. Adams, Sue Fitzgerald, William Fone, John Hamer, Morten Lindholm, Robert McCartney, Jan Erik Moström, Kate Sanders, Otto Seppälä, Beth Simon, Lynda Thomas.
- 2008, "Contributing student pedagogy" by John Hamer, Quintin Cutts, Jana Jackova, Andrew Luxton-Reilly, Robert McCartney, Helen Purchase, Charles Riedesel, Mara Saeli, Kate Sanders, Judithe Sheard.
- 2018, "Introductory programming: a systematic literature review" by Andrew Luxton-Reilly, Simon, Ibrahim Albluwi, Brett A. Becker, Michail Giannakos, Amruth N. Kumar, Linda Ott, James Paterson, Michael James Scott, Judy Sheard, Claudia Szabo.

From these, the working group report "Contributing student pedagogy" by John Hamer, Quintin Cutts, Jana Jackova, Andrew Luxton-Reilly, Robert McCartney, Helen Purchase, Charles Riedesel, Mara Saeli, Kate Sanders, Judithe Sheard was chosen as the Top Working Group Report

Significant programs that provided a springboard for further technical efforts

The SIGCSE Special Projects Fund provides grants up to $5000 per project and has a call for proposals in November and May of each year.

The November 2019 call resulted in 38 applications of which 5 were funded for an acceptance rate of 13%.

- Jakita Thomas from Auburn University, USA was awarded $5000 for a project titled "The Firsts: Exploring the Intersectional Experiences of Black Women in Computing Who Were First to be Conferred Ph.D.s in Computing/Computer Sciences at Colleges/Universities".
- Matthias Hauswirth from Universite della Svizzera italiana in the Switzerland was awarded $5000 for a project entitled “Mastery Learning in Programming Courses.”
- Wei Jin from Georgia Gwinnett College, USA was awarded $5000 for a project titled “An Online Tool for Easy-to-set-up and Auto-gradable Full Tracing Exercises”.
- Brett Becker from University College Dublin, Ireland was awarded $4,785 for a project entitled “The Crossroads of Computer Science: Stories of ‘Sideways’ and ‘Hidden’ Computer Scientists.”
- Daniela Marghitu from Auburn University, USA was awarded $3,500 for a project entitled “Developing Coding Instruction Videos for K12 Hearing Impaired Students Using American Sign Language.”

The May 2020 call was cancelled due to the global pandemic and the financial uncertainty about the on-the-ground cancellation of the SIGCSE Technical Symposium in March 2020.

ITiCSE 2020 had ten working groups on the following topics:

(1) Choosing code segments to exclude from code similarity detection,

(2) Capturing and Characterising Notional Machines

(3) Toward High-Performance Computing Education

(4) Assessing how pre-requisite skills affect learning of advanced concepts

(5) Developing a Model Augmented Reality Curriculum

(6) Cloud Computing Curriculum: Developing Exemplar Modules for General Course Inclusion

(7) Meaningful Assessment at Scale: Helping Instructors to Assess Online Learning

(8) Reviewing Computing Education Papers

(9) Developing Competency Statements for Computer Science Curricula: The Way Ahead.

The participants in the working groups develop a research project that culminates in a peer-reviewed paper. The projects foster international research collaborations.

Innovative programs which provide service to some part of your technical community

Every other year, the SIGCSE Board runs a workshop for graduate students and new academics called the New Educators Wednesday Roundtable (NEWR). The workshop features small group discussions among the students and presentations by seasoned academic mentors providing advice and guidance to faculty who are just starting out in their careers. Topics for discussion and presentation centered around finding a career path; balancing teaching, research, and service; working with colleagues; navigating the tenure

process; course organization; and student mentoring advice. NEWR took place on Wednesday, March 11, 2020 as a pre-symposium event before the 2020 symposium and was held prior to the symposium's cancellation. The workshop was organized by Zachary Dodds (Harvey Mudd College) and Diane Horton (University of Toronto).

On alternate years, the SIGCSE Board runs a workshop for department chairs. The next Department Chair's Roundtable will be held in conjunction with the SIGCSE Technical Symposium in March 2021.

SIGCSE has a Travel Grant Program for faculty and teachers who have never attended the SIGCSE Technical Symposium. The 51st SIGCSE Technical Symposium was scheduled to take place in 2020, but was cancelled the evening before the first day of the conference. The program had awarded 20 grants for 2020. Participants who were not able to attend this year will be allowed to use their travel grant in the coming year.

There were two doctoral consortia associated with SIGCSE conferences during this year.

- A doctoral consortium ran in Toronto, Canada just prior to the 2019 The International Computing Education Research Conference (ICER). The students presented their work to the discussants and engaged in discussion about various topics with regard to graduate school, research, and careers. The doctoral consortium was attended by 20 graduate students in computer science education. 11 of the participants were women, and 9 were men. 11 participants were from the United States, 3 from Canada, 5 from Europe, and 1 from Australia. SIGCSE provides travel grants to the students and partial funding for lodging during the workshop and also during ICER 2019. The SIGCSE Board will continue to fund up to twenty Doctoral Consortium grants for participants of the ICER conference in 2020.
- There was also a doctoral consortium virtually associated with ITiCSE 2020 (originally scheduled in Tronheim, Norway). 11 students attended the event, which was supported ACM Europe. The doctoral consortium was organized by Mark Zarb (Robert Gordon University, UK) and Neena Thota (UMass Amherst, USA) and focused on nurturing students' research and orienting them in the ITiCSE community.

Events or programs that broadened participation either geographically, or among under-represented members of your community

SIGCSE established a new conference in 2019. The ACM Global Computing Education Conference (CompEd) will be offered once every two years and will be hosted in countries that do not currently have an annual SIGCSE conference. This year, the board has set the second CompEd conference to be held in Hyderabad, India in December 2021. The CompEd steering committee is actively seeking out venues in South America for future CompEd conferences.

In June 2020, the SIGCSE Board called for volunteers to form a SIGCSE Committee on diversity, equity, inclusion, and anti-racism to help better guide the SIGCSE community in these efforts. Leadership for this group has been identified and the leadership cohort is currently working on a charter and set of events and activities to help guide the board and the community in this important work.

Key Issues for the Next 2-3 Years

This year, 2020, had provided a series of challenges for SIGCSE (and all organizations) that will reverberate for years to come.

The first challenge is the adaptation of conferences from strictly in-person events to hybrid or fully online events. For 2020, all of our conferences were either cancelled or scheduled virtually. This will likely continue into the first part of 2021. The challenge for these events is to make them as valuable to the community in terms of engagement as in-person events. These types of events also present an opportunity to engage those who were previously unable to attend in-person events for various reasons with the community. While there have been several successful experiments with virtual events (even before the pandemic), the logistics of hybrid events have historically been a challenge.

The second challenge is the renewed called to action with regards to racism, diversity, and inclusion in all aspects of society. Professional societies are not immune and certainly can be one place where racism and exclusion can thrive. While there are several ways in which SIGCSE promotes and strives for diversity and inclusion and has succeeded, we have several areas where we could improve, particularly around conference leadership, which has been challenging to recruit for historically, and has been especially difficult to recruit diverse candidates for a number of reasons. It is imperative, however, that we work to create systems that allow for diverse candidates to be identified, recognized, and elevated in these positions.