



## Contents

SIGCSE Board .....	1
SIGCSE News in Brief .....	1
Upcoming Dates and Deadlines .....	2
Introducing SIGCSE Virtual 2024 .....	2
Koli Calling 2024: Call for Submissions .....	3
RESPECT 2024: Call for Participation .....	3
ITiCSE 2024: Call for Participation .....	4
ICER 2024: Call for Participation .....	4
2024 SIGCSE Technical Symposium Report .....	5
HFOSS Education .....	9
Member Spotlight: Heidi J.C. Ellis .....	13

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## SIGCSE Board

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## SIGCSE News in Brief

Welcome to the April issue of the SIGCSE Bulletin for 2024. We begin with exciting news: the introduction of the SIGCSE Virtual Conference, scheduled for December 2024. We hope that this addition to our expanding selection of conferences provides the opportunity for broader participation among the SIGCSE community. We also have a call for submissions from the Koli Calling Program Committee, calls for participation in a number of upcoming conferences (RESPECT, ITiCSE, and ICER), and a recap of the SIGCSE Technical Symposium that took place in March.

This issue highlights the productive efforts of a community of SIGCSE members engaging students in HFOSS (Humanitarian Free and Open Source Software) development. Gregory Hislop and Heidi Ellis, two of the pioneers and leaders in this project, discuss the benefits and challenges of HFOSS development as an opportunity for learning, and they provide pointers for other educators to get involved.

Following this overview, Dr. Ellis traces her journey as an educator and HFOSS proponent in this month's Member Spotlight.

We hope you enjoy this issue of the Bulletin; as always, we invite you to contribute to future issues, by sending brief pieces of general SIGCSE interest to the co-editors.

## Upcoming Dates and Deadlines

Conference	Location	Dates	Submission Deadline
<a href="#">RESPECT</a>	Atlanta, GA, US	16 – 17 May 2024 (on-site)	-----
<a href="#">ITiCSE</a>	Milan, Italy	8 – 10 July 2024 (on-site)	-----
<a href="#">ICER</a>	Melbourne, Australia	9 – 12 Aug 2024 (on-site)	-----
<a href="#">Koli Calling</a>	Koli, Finland	12 – 17 Nov 2024 (on-site/virtual)	Jun 21 (full/discussion papers) 20 Sep (posters/demos)
<a href="#">SIGCSE Virtual</a>	-----	5 – 7 Dec 2024 (virtual)	20/27 May (Round One) 1 July (Round Two)

Other conferences operate in cooperation with SIGCSE and are posted on the SIGCSE web site at [sigcse.org/events/incoop.html](http://sigcse.org/events/incoop.html).

## Introducing SIGCSE Virtual 2024

By Mohsen Dorodchi, Conference Chair

SIGCSE Virtual 2024, the organization's newest conference, will be held from **5–7 December 2024**. SIGCSE Virtual addresses issues common among educators working to develop, implement, and/or evaluate computing programs, curricula, and courses, as well as broadening participation in computing and making it more inclusive. The conference provides a forum for sharing new ideas for syllabi, laboratories, and other elements of teaching and pedagogy, at all levels of instruction. We endeavor to have a diverse selection of technical sessions and opportunities for learning and interaction.

SIGCSE Virtual 2024 will be a purely virtual event. Online participants will be able to participate in keynotes, paper presentations, a Doctoral Consortium, panels, lightning talks,

and posters. Online registration will be *significantly* cheaper than SIGCSE's other conferences. Our hope is that this will allow everyone to present their work at SIGCSE Virtual 2024, as there will be no travel costs associated with participation!

**Conference Times:** Since this conference will have attendees from around the world across many time zones, we expect one day of the conference to be held at a time most convenient to attendees from North and South America, one day of the conference to be held at a time most convenient to attendees from Europe and Africa, and one day of the conference to be held at a time most convenient to attendees from Asia and Australasia. Specific timings of presentations will depend on how many papers, panels and lightning talks/posters get accepted from a particular region. Presenter preference will be considered when setting presentation times.

**Deadlines:**

**20 May:** Abstract (Papers only)

**27 May:** Round One (Papers/Panels)

**24 June:** Round One author notification

**1 July:** Round Two (Lightning Talks/Posters)

**15 July:** Round Two author notification

**30 September:** All final submissions due

All deadlines are 23:59 AoE (Anywhere on Earth, UTC-12h).

SIGCSE is part of the [Open Surround](#) program. The SIGCSE Virtual 2024 papers will be freely available to the world via the Digital Library for one month surrounding the conference.

Please visit the conference website for more details: <https://sigcsevirtual.acm.org/>

Please direct questions or concerns to [sigcsevirtual2024-program@sigcse.org](mailto:sigcsevirtual2024-program@sigcse.org)

**Koli Calling 2024: Call for Submissions**

By Andreas Mühling and Juho Leinonen, Conference Chairs

We invite you to submit a paper or a poster for the 24th Koli Calling International Conference on Computing Education Research (Koli Calling 2024) to be hosted in Koli, Finland, November 14-17, 2024.

Koli Calling is one of the leading international conferences dedicated to the scholarship of teaching and learning and to education research in the computing disciplines. It is a single-track conference for original and novel work with research, practice and systems presentations as well as a keynote and invited talks. The conference is known for its moderate size, intimate atmosphere, and lively discussions.

As in previous years, there will be a **doctoral consortium** before the main conference. See below for more details.

**New for this year:** There will be a pre-conference workshop held in Joensuu, Finland on November 13th, the conference itself will

begin on November 14th in the afternoon (i.e. one day earlier than usual).

There will be an asynchronous online part to offer presenting and discussing your work without traveling to Koli, but we hope to see most of you in-person again where the majority of accepted submissions will be presented.

We welcome submissions in the area of **computing education**: the teaching and learning of computing topics. Within that broad scope, contributions may involve one or more of the following:

- Empirical studies of computing education;
- Teaching approaches and assessment in computing education;
- Development, use, and evaluation of tools to support computing education;
- Theory in computing education;
- The learning of computing in any context; e.g., higher education, K-12, informal learning, lifelong learning, teachers' professional development;
- Distance, online, and blended learning of computing topics;
- Learning analytics and educational data mining in the area of computing education;
- Methodological development and instruments for computing education research;
- Reviews to support computing education or computing education research;
- Any other aspects of the teaching and/or learning computing topics.

Please note that generic educational technology and applications of computing for educational purposes are not in scope, except where they are used for computing education.

**RESPECT 2024: Call for Participation**

By Tamara Pearson, Conference Chair

We are excited to invite you to attend **RESPECT 2024**. The Conference on Research in Equity and Sustained Participation in Engineering, Computing, and Technology

(RESPECT) is the premier venue for research on equity, inclusion, and justice in computing and computing education. Now in its ninth edition, the RESPECT 2024 conference will be held in Atlanta, GA on May 16-17, 2024.

In yet another U.S. election year, we are taking the opportunity to focus RESPECT 2024 on interrogating the many ways research and policy inform one another. At RESPECT 2024 we will discuss ways to move our work out of the shadows and back into the spotlight. Some of the questions we will tackle are:

- What role can researchers play in the development of policy?
- How can we continue to fight for justice when policy dictates otherwise?
- How can we more effectively engage with our legislators who we need our help?

We hope you will join us in Atlanta for a thought-provoking and community building conference.

### **ITiCSE 2024: Call for Participation**

**By Violetta Lonati, Mattia Monga, and Erik Barendsen, Conference Chairs**

The 29th ITiCSE is approaching: this year the conference will be hosted by the University of Milan (Italy), which is also celebrating its 100<sup>th</sup> birthday this year. We look forward to welcoming you there from July 5 to 10, 2024.

Milan is a city in northern Italy, capital of Lombardy, and the second most populous city proper in Italy after Rome. The city proper has a population of about 1.4 million, while its metropolitan city has 3.26 million inhabitants. Milan hosts seven universities, the biggest one being the Università degli Studi di Milano “La Statale,” with approximately 60,000 students and 2000 tenured faculty members organised in 31 departments. Milan is easy to reach and it is famous for its wealth of historical and modern sights — the Duomo, one of the biggest and grandest Gothic cathedrals in the world, La Scala, one of the best established opera houses

in the globe, the Brera art gallery, with some of the finest artistic works in Europe, the UNESCO’s World Heritage Site “Basilica di Santa Maria delle Grazie,” containing one of the world’s most famous paintings: Leonardo da Vinci’s “The Last Supper.” Milan is sometimes described as a paradise for shopping, football, opera, and nightlife.

This is the third time the ITiCSE conference is organized in Italy. Both the previous editions were held in Bologna: in fact the famous [ITiCSE Bell](#) was purchased for the 2006 edition.

ITiCSE 2024 will be organized only with face-to-face modes (conference, doctoral consortium and working groups). Registration will open in March; we suggest booking your accommodation quickly since Milan is a busy town, and in July some fashion events are also scheduled. The working groups and the doctoral consortium will be at the Computer Science Department located in Città Studi (north-east of the town). The main conference will be in the historical building of the University very close to the Duomo, the geometrical center of Milan. Milan, however, is not a very large city, and the public transportation is fast and frequent.

We are going to have an exciting program, with 108 research papers, 2 keynote, posters and other side events. Please visit the conference website for updates over the coming weeks and months: <https://iticse.acm.org/2024>

### **ICER 2024: Call for Participation**

**By Paul Denny, Margaret Hamilton, Leo Porter, Briana Morrison, ICER 2024 Chairs**

The 20th annual ACM Conference on International Computing Education Research (ICER) will be hosted by RMIT University in the vibrant city of Melbourne, Australia. The conference will take place Tuesday 13th - Thursday 15th August 2024, following the Doctoral Consortium and the Work in Progress Workshop which will be held on Monday 12th August. You can participate physically by



traveling to Melbourne or virtually where there will be an option for online discussions during the conference occurring in the local time zone.



*Photo Credit: Goran Has*

Registration will open in May, and we will send an announcement to the mailing list and on our regular social media channels. We anticipate another conference packed with exceptional papers representing the best of computing education research along with the doctoral consortium, lightning talks, poster sessions, and the work-in-progress workshop. The conference is co-located with some of the best cafes in the world (outside of Auckland), and physical attendees will be able to enjoy all that Melbourne has to offer.

Please visit <https://icer2024.acm.org/> for updates or email [site-chairs@icer.acm.org](mailto:site-chairs@icer.acm.org) with questions. See you soon!

### **2024 SIGCSE Technical Symposium Report**

By Ben Stephenson and Jeffrey Stone, SIGCSE TS 2024 Symposium Co-Chairs; Lina Battestilli, Samuel A. Rebelsky, and Libby Shoop, SIGCSE TS 2024 Program Co-Chairs; Delaram Yazdansepa and Oluwakemi Ola, SIGCSE TS 2024 Hybrid Experience Co-Chairs



The 2024 SIGCSE Technical Symposium was a tremendous success! It brought together 1,745 people with the common goal of improving computer science education, making it the

second largest SIGCSE Technical Symposium ever! While we didn't quite reach the attendance level achieved in 2019, it looks like breaking that record might be feasible in 2025, and it was wonderful to welcome so many people to Portland after our last attempt to meet there was disrupted in the early days of the pandemic. Most attendees choose to attend the symposium in-person, with approximately 10% opting for online attendance. Whether you attended in-person or online it was wonderful to have so many of you at the conference.



*Photo Credit: Cole Rodger, coleimage.com*

This year's program was packed with excellent content. It included two fantastic keynote addresses, presentations by four SIGCSE award winners, a record-breaking 216 papers, and more than 300 other pieces of work from authors around the world. This is the largest symposium program to date and required some adjustments to accommodate all of it, including increasing the number of parallel sessions and extending the symposium to include a set of parallel sessions after lunch on Saturday with papers, panels, and the ever-popular nifty assignments session. It was a wonderful opportunity to share and learn about the latest advances in our field and to renew existing relationships and make new connections.



Todd Zakrajsek, Opening Keynote  
*Photo Credit: Cole Rodger, coleimage.com*

Our opening keynote address, titled “Guiding Students Along Their Academic Path: Key Aspects of Learning That Impact All Learners,” was delivered by Dr. Todd Zakrajsek of the University of North Carolina. His energetic style was well received, as were his suggestions about how to positively impact students. This year’s closing keynote was delivered by Dr. Rachel Rose of Industrial Light and Magic. Her talk, titled “Inspiring a Galaxy of New Innovators at the Intersection of Art & Science,” explored some of the fascinating technologies used in the production of today’s movies and television shows, while also touching on the value of open-source software and benefits provided by diverse teams. Both speakers delivered fantastic addresses.

Four SIGCSE award winners were recognized at this year’s Technical Symposium. Dr. Chris Stephenson accepted her ACM SIGCSE Award for Distinguished Service to the Computer Science Education Community at the First Timers’ Lunch on Thursday and delivered an address titled “Tales from the Trenches: Using What We’ve Learned to Move CS Education Forward.” The inaugural ACM SIGCSE Award for Broadening Participation in Computing Education was awarded to Jandelyn Plane. Her address, titled “Find Your Drop to Add to the River,” was delivered during the Friday morning plenary session.



Alison Clear, SIGCSE Board Chair, presenting Jandelyn Plane with the ACM SIGCSE Award for Broadening Participation in Computing Education

*Photo Credit: Cole Rodger, coleimage.com*

This year’s ACM SIGCSE Test of Time Award was awarded to the 2008 paper “Evaluating a new exam question: Parsons problems” by Paul Denny, Andrew Luxton-Reilly, and Beth Simon. Paul, Andrew and Beth accepted their award during the Friday morning plenary session and led a session titled “A Puzzling Programming Pedagogy: The Persistent Presence of Parsons Problems” on Saturday that discussed the ongoing interest in these problems. Finally, Michael Caspersen accepted his ACM SIGCSE Award for Outstanding Contribution to Computer Science Education during the SIGCSE lunch on Saturday. His address was titled “The computational revolution and our professional responsibility.” Congratulations to all of the award winners!



Emcee Mark Sherriff with Sarah Heckman during a Coffee Break Broadcast

Photo Credit: Cole Rodger, coleimage.com

For the third year in a row, the SIGCSE Technical Symposium was a hybrid event, with approximately 10% of participants joining us remotely from around the world. To keep virtual attendance affordable, we scaled back the online portions of the program compared to previous years. Still, online participants were able to present and discuss their work, attend keynotes and selected papers, panels, and special sessions, participate in selected workshops, and converse with each other in our new Community Circle times as well as through the Whova app. Some in-person attendees joined the online sessions by connecting to the online sessions while in Portland and by viewing the online paper presentations in the designated room at the convention center.

## Best Papers

Many excellent papers were submitted to this year's Technical Symposium. This made the selection of a small number of best papers a particularly difficult task. The Program Chairs considered reviewer scores and APC recommendations during the selection process and ultimately identified four best papers in the Computing Education Research and Experience Reports and Tools tracks, and three best papers in the Position and Curricula Initiatives

Track. Congratulations to all of the authors of these papers!

## ***Best Papers: Computing Education Research***

*Use of AI-driven Code Generation Models in Teaching and Learning Programming: a Systematic Literature Review* by Doga Cambaz, Delft University of Technology, and Xiaoling Zhang, Delft University of Technology

*Does Curricular Complexity in Computer Science Influence the Representation of Women CS Graduates?* by Albert Lionelle, Khoury College of Computer Sciences, Northeastern University, McKenna Quam, Northeastern University, Carla Brodley, Northeastern University, Center for Inclusive Computing and Catherine Gill, Northeastern University

*Computing Self-Efficacy in Undergraduate Students: A Multi-Institutional and Intersectional Analysis* by Vidushi Ojha, University of Illinois at Urbana-Champaign, Leah West, Harvey Mudd College and Colleen Lewis, University of Illinois at Urbana-Champaign

*A Large Scale RCT on Effective Error Messages in CS1* by Sierra Wang, Stanford University, John C. Mitchell, Stanford University, and Chris Piech, Stanford University

## ***Best Papers: Position & Curricula Initiatives***

*Transforming Grading Practices in the Computing Education Community* by Adrienne Decker, University at Buffalo, Stephen Edwards, Virginia Tech, Brian McSkimming, University of Oklahoma, Bob Edmison, Virginia Tech, Audrey Rorrer, University of North Carolina Charlotte and Manuel Pérez Quiñones, University of North Carolina Charlotte

*Beyond HCI: The Need for Accessibility Across the CS Curriculum* by Yasmine Elglaly, Western Washington University, Catherine Baker,



Creighton University, Anne Ross, Bucknell University and Kristen Shinohara, Rochester Institute of Technology

*Teaching AI to K-12 Learners: Lessons, Issues, and Guidance* by Shuchi Grover, Looking Glass Ventures/Stanford University

### ***Best Papers: Experience Reports and Tools***

*Automating Source Code Refactoring in the Classroom* by Eman Abdullah Alomar, Stevens Institute of Technology, Mohamed Wiem Mkaouer, University of Michigan - Flint, and Ali Ouni, ETS Montreal, University of Quebec

*Integrating Natural Language Processing in Middle School Science Classrooms: An Experience Report* by Gloria Katuka, University of Florida, Srijita Chakraborty, Indiana University, Hyejeong Lee, Indiana University, Sunny Dhama, Toni Earle-Randell, University of Florida, Mehmet Celepkolu, University of Florida, Kristy Elizabeth Boyer, University of Florida, Krista Glazewski, North Carolina State University, Cindy Hmelo-Silver, Indiana University and Tom McKlin, The Findings Group

*Cultural-Centric Computational Embroidery* by F. Megumi Kivuva, University of Washington, Jayne Everson, University of Washington, Camilo Montes De Haro, Bellevue College and Amy Ko, University of Washington

*Accessible to Whom? Bringing Accessibility to Blocks* by Andreas Stefik, University of Nevada at Las Vegas, William Allee, University of Nevada at Las Vegas, Gabriel Contreras, University of Nevada at Las Vegas, Timothy Kluthe, University of Nevada at Las Vegas, Alex Hoffman, University of Nevada at Las Vegas, Brianna Blaser, University of Washington and Richard Ladner, University of Washington

Congratulations again to all of the Best Paper Award winners! These papers, as well as all of

the other papers that were presented at the Technical Symposium, are now available in the ACM Digital Library, as are abstracts for the works presented in the symposium's other tracks.

### **Thank you!**



SIGCSE TS 2024 Student Volunteers  
Photo Credit: Cole Rodger, coleimage.com

A tremendous number of people contributed to the success of this year's symposium. We'd like to express our sincere thanks to everyone who volunteered their time and effort: committee members, associate program chairs, reviewers, and students. We'd also like to recognize the work done by all of the authors that submitted their work – the Technical Symposium wouldn't exist without your contributions. Our supporters and exhibitors were also important contributors to this event, both financially, and through their contributions to the conference program and the exhibit hall. The work done by our good friends at DLPlan, the Oregon Convention Center, Travel Portland, and all of our other service providers is also greatly appreciated. Thank you, everyone, for making this year's symposium so successful.

### **Outstanding Reviewers and APCs**

This year, we presented "Outstanding Reviewer" and "Outstanding APC" awards to some of our many wonderful reviewers and associate program chairs (APCs). Reviewers were nominated by APCs (who did not know their identities) based on the quality of reviews and participation in discussion. APCs were nominated by the program chairs based on the quality of their meta-reviews and their



leadership in discussions. While we realize that we did not manage to identify all the outstanding reviewers and APCs, all of these reviewers and APCs were certainly outstanding.

**Outstanding APCs:** Julio Bahamon, *UNC Charlotte*; Bradley Beth, *Vermont State University*; Jeremiah Blanchard, *University of Florida*; Dennis Bouvier, *United States Air Force Academy*; Leigh Ann Delyser, *CSforAll*; Laura Dillon, *Michigan State University*; Chris Gregg, *Stanford University*; Michael Nowak, *University of Illinois at Urbana-Champaign*; Miranda Parker, *San Diego State University*; James Paterson, *Glasgow Caledonian University*; Thomas Price, *North Carolina State University*; Leen-Kiat Soh, *University of Nebraska-Lincoln*; Luther Tychonievich, *University of Illinois at Urbana-Champaign*; and Charles Wallace, *Michigan Technological University*.

**Outstanding Reviewers:** Lecia Barker, *University of Colorado Boulder*; Paul Bruno, *University of Illinois at Urbana-Champaign*; David Bunde, *Knox College*; Jonathan Calver, *University of Toronto*; Bruce Char, *Drexel University*; Dhruv Hemang Dhamani, *University of North Carolina, Charlotte*; Steve Edwards, *Virginia Tech*; Laila El-Hamamsy, *Ecole Polytechnique Fédérale de Lausanne (EPFL)*; Casey Fiesler, *University of Colorado Boulder*; Morgan Fong, *University of Illinois at Urbana-Champaign*; Max Fowler, *University of Auckland*; Colton Harper, *University of Nebraska-Lincoln*; Diane Horton, *University of Toronto*; Christopher Hovey, *University of Colorado Boulder*; Anne Drew Hu, *Michigan State University*; Jason King, *North Carolina State University*; Devorah Kletenik, *Brooklyn College, CUNY*; Tobias Kohn, *TU Wien*; Kevin Lin, *University of Washington*; Rifat Sabbir Mansur, *Virginia Tech*; Thomas Marlowe, *Seton Hall University*; Craig S. Miller, *DePaul University*; Sagnik Nath, *University of California, Santa Cruz*; Sara Nurollahian, *University of Utah*; Brian O'Neill, *Quinnipiac*

*University*; Tina Pavlovich, *Dartmouth College*; Andrew Petersen, *University of Toronto*; Seth Poulsen, *Utah State University*; Yolanda Rankin, *Emory University*; Cigdem Sengul, *Brunel University*; Mohammad Toutiaee, *Northwestern University*; Yesenia Velasco, *Duke University*; Jane Waite, *Raspberry Pi Foundation*; and Jina Wilde, *University of Texas at San Antonio*.



Next year's SIGCSE Technical Symposium will be held in Pittsburgh from February 26 to March 1, 2025. The 2025 symposium is approximately three weeks earlier than it was in 2024, which has forced the 2025 organizers to shift the round 1 submission dates into July. Additional information about the 2025 symposium, including the exact submission dates, can be found at the conference website: [sigcse2025.sigcse.org](http://sigcse2025.sigcse.org)

### HFOSS Education

By Gregory W. Hislop and Heidi J.C. Ellis

Open source software has become part of the mainstream of software development, with the adoption of open source by a large majority of business and governmental organizations. Results of recent surveys [1] indicate that 95% of responding organizations use open source in mission critical software applications and plan to increase spending on open source activities in the coming years.

One reason for the broad adoption of open source is that it delivers significant innovation for businesses. Many emerging technologies and approaches including cloud computing,

containerization, and serverless computing originated with open source. Other areas such as AI and FinTech have significant products that are open source. Processes such as continuous integration and DevOps are heavily based on open source concepts. Open source application software also provides a basis for collaboration across companies, even within the same industry.

The widespread use and development of open source creates a clear need for more software professionals who have open source software experience. This provides a strong motivation for students to learn about open source tools and practices as a part of their undergraduate degree programs.

Humanitarian Free and Open Source Software (HFOSS) is software that provides some social benefit and provides an opportunity for students to learn all the general principles and practices of open source and engage in computing for social good at the same time.

### **Benefits of HFOSS Education**

The idea of involving students in on-going software projects with a community of developers and clients is intuitively appealing to many faculty and students. Experience with HFOSS education [2] has shown a variety of benefits that can be organized into the following general areas:

#### **Attracting and retaining students**

There are many aspects of the use of HFOSS that have the potential to attract new students to computing as well as to enhance the interest of existing students. There is also evidence that HFOSS is particularly helpful for attracting students in underrepresented groups [3]. This appeal seems to be due to:

**Relevance:** Conveying the relevance and practical application of computing seems to be important to attracting a broader range of students to the computing disciplines. Female students in particular appear to desire to

understand the applicability of software to practical needs.

**Social Impact:** The nature of HFOSS, which focuses on helping people, can engage students who respond to the incentive of helping others in a visible and concrete manner.

**Community:** The HFOSS community is diverse, composed of people from various countries, backgrounds and professions. HFOSS has a potential user base that spans the globe. Student participation in this community provides opportunities to expose students to developers and also humanitarian professionals and users from a variety of walks of life.

### **Enhancing student learning**

Student work on open source projects provides learning opportunities in key technical areas including dealing with large code bases, testing techniques, software development tools such as version control systems, and experience with software processes including Git-based development processes. Learning in these areas can be approached without open source projects, but the open access to all project artifacts as well as the ability to interact with the open source community provides students with exposure to a professional project that is difficult to achieve with closed-source projects. This gives open source projects a real advantage in preparing students for professional versions of these skills. Key aspects of this experience that relate to software development include:

**Software process:** Students participating in an HFOSS project must conform to the development process used by a particular FOSS project. Students gain an understanding of the steps necessary to plan and carry out a software project in a real-world environment for a significant project.

**Distributed development:** The global reach of the HFOSS community provides a unique opportunity for students to develop software in collaboration with professionals in a variety of locations and from a variety of cultures. This

experience prepares students for increasingly distributed professional environments.

**Project scale and complexity:** HFOSS provides students with a project of significant size and corresponding complexity, allowing students to see first-hand how these factors create the requirement for software engineering tools and processes.

**Projects with long product life:** In order to better understand the development lifecycle, students need to be exposed to a project that is ongoing and has a longer lifespan than a single-semester project. HFOSS projects can help students gain an understanding of software maintenance and evolution and to understand the impact of decisions made by developers earlier in the product's history.

**Open Source:** Beyond humanitarian FOSS, open source software has become a significant part of the entire software industry. Students need to understand the role of open source and its impact on business.

### **Creating social benefit**

A core result of successful HFOSS education is to make real contributions to the HFOSS products. This result fits academic environments in several ways:

**Student societal awareness:** A critical aspect of a student's education is gaining an understanding of social responsibility. Educational institutions have long worked to help students prepare for lives as good citizens and useful members of the community and the world at large. In a manner similar to pro bono work in law, HFOSS allows computing students to employ their computing skills to help others and to develop an awareness of the potential of computing for social good.

**Institutional outreach and social service:** Most academic institutions include contributions to the community as part of their mission. The participation in and support of an HFOSS project allows the institution to fulfill this mission in an unusual manner.

**Leveraging academic resources:** The involvement of multiple institutions collaborating on HFOSS projects could bring substantial resources to bear on social needs. In this manner, the academic community at large can have a positive impact at a global level.

In summary then, these three themes provide a broad perspective on what constitutes success for HFOSS educational projects. At the core, the goal is to use HFOSS to enable student learning. More generally, HFOSS may help attract students to the discipline. Finally, HFOSS provides a potentially interesting contribution to the social mission of academic institutions.

### **Challenges and Opportunities for Instructors**

HFOSS education appeals to many instructors as an excellent way to motivate learning about software engineering, to expose students to software practice, and to introduce students to computing for social good. Basic approaches to HFOSS education have a low barrier to entry.

A first level of engagement might be to use HFOSS projects in class examples or as case studies. Open source projects typically provide access to a full range of software artifacts starting with source code, but also including issue trackers, product documentation, planning documents, etc. This provides a rich base of source materials for study.

A second level of engagement could be to fork the project (creating a copy of the full source code) and work with the code, e.g. doing analysis or adding features, but not engaging with the project development community.

A third level of engagement would be to have students participate in the HFOSS project community. This approach is significantly more difficult but also has larger potential rewards for the students. The hurdles of HFOSS community engagement include:

First, many instructors are not familiar with open source culture or tools and face steep learning

curves for these topics, as well as for project domain knowledge. Instructors face an additional learning curve related to supporting student participation in the HFOSS project. Assignment creation, assessment, and development of rubrics can all be challenging.

Second, instructors need to help students adjust to a less-structured learning environment and one that has significant size and complexity. Instructors also need to help students learn about open source culture and technologies. Student expectations about the role of the faculty member as a “guide by the side” rather than the “sage on the stage” must be set early and frequently reinforced. Instructors may also need to serve as a liaison between their students and the open source community, which may take additional time.

Third, instructors need to select an appropriate HFOSS project for use in a course. Ideal projects are open to student contributions, welcoming, and have clear communication channels, all while also fulfilling course learning objectives.

Finally, academic and HFOSS project planning may not match. An HFOSS project schedule and the instructor’s academic calendar may not align well. An HFOSS project may make major, unplanned changes in direction. In addition, instructors must plan for contributions over the limited time of a term, once or twice a year.

Instructors who have engaged extensively with HFOSS projects [4] also report wanting more time to prepare course materials and having difficulty finding enough course time to cover HFOSS education.

Faculty interested in HFOSS education have been working for some years to help with the challenges listed above [5]. Progress has included:

- Development of a community of HFOSS educators who share challenges and results.
- Creation and sharing of instructional materials that are available to any interested

instructor under a Creative Commons license.

- Development and application of a basic rubric to help instructors evaluate whether an HFOSS project is suitable for use in courses.
- Delivery of faculty workshops and other meetings to help faculty learn about open source and HFOSS education. These events are often held in conjunction with SIGCSE conferences and also include a workshop series called POSSE (Professors’ Open Source Software Experience).



## Outcomes

A series of evaluations of HFOSS education indicate that a variety of positive benefits are realized via this approach. These include:

Software engineering learning - Based both on student’s self-assessment and review of student reflective writing, HFOSS engagement deepens student understanding of software engineering including software processes, team interactions, and SE tool use.

Appeal to underrepresented groups - Based on a series of studies, all student groups tend to prefer educational use of humanitarian over non-humanitarian software applications. In addition, women students and some underrepresented ethnic groups seem to have a significantly stronger preference for humanitarian software applications than students who are white men.

## Getting Involved

Instructors interested in exploring HFOSS education can begin by visiting the TOS site at <https://TeachingOpenSource.org>

On that site, select “Our Community” and then “Join Us” to join the TOS email list. This is a



very low volume list where events related to HFOSS education are announced. The site also contains a collection of Creative Commons licensed learning materials available for



classroom use.

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## Member Spotlight: Heidi J.C. Ellis

By Julie M. Smith and Charles Wallace, SIGCSE  
Bulletin Co-Editors; Heidi J.C. Ellis

*Dr. Ellis is a Professor of Computer Science and Information Technology at Western New England University.*

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

My undergraduate degree is in animal science and I taught horseback riding for many years which convinced me that I wanted to teach. I returned to school for my M.S. and Ph.D. in Computer Science and Engineering and started teaching at Rensselaer at Hartford while my children were small. During that time, I was invited to join the Working Group on Software Engineering Education and Training (WGSEET). This group was initially funded by Carnegie Mellon's Software Engineering Institute and focused on promoting software engineering education. Many foundational efforts such as the Software Engineering Body of Knowledge (SWEBOK) and software engineering curriculum development were influenced by this group. We met in person twice a year, before SIGCSE and before CSEET. I worked with Nancy Mead, who was a tremendous mentor, on industry-academic collaborations for promoting software engineering education. This experience sparked my interest in computing education and I became more active in the SIGCSE community.



*Photo credit: Western New England University*

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

Some of my earliest experiences at Rensselaer at Hartford were with online education where I investigated the differences between online and face-go-face education and whether it took more time to teach online versus face-to-face. This was in the late 1990's and early 2000's so the technologies were much more limited than today.

In the 2000's, I started a position at Trinity College in Hartford, CT. While there, I worked with Ralph Morelli and Trishan de Lanerolle to start the HFOSS project which investigated student learning within humanitarian free and open source software (HFOSS) projects. We involved students in ongoing HFOSS projects in both classes and summer internship experiences. One main goal of the work is to determine whether the humanitarian nature of HFOSS projects can be utilized to increase the diversity of undergraduate computing students.

Based on that effort, Greg Hislop (Drexel University) and I started collaborating to identify ways to support student success in an HFOSS project and how to replicate that success across multiple academic institutions. Since then, the effort has received multiple NSF grants to support various aspects of the work. We learned that many faculty have never

participated in large-scale software development and so we expanded our research team to five faculty members and developed a set of workshops to expand faculty expertise in supporting student involvement in HFOSS. We have run over a dozen Professor's Open Source Software Experience (POSSE) workshops that have reached over 200 faculty members.

Our core research team is now comprised of 13 faculty members from eight different institutions. We are currently investigating how HFOSS education can affect student learning, engagement, retention, and diversity in computing degree programs. Part of this work involves examining how HFOSS education impacts the role and identity of both students and instructors. We are also exploring ways to expand adoption of HFOSS education by instructors via two mechanisms: educational HFOSS projects which are HFOSS projects maintained by a group of faculty members; and HFOSS kits which are entire HFOSS projects captured in a container with exercises. This latter approach allows students to learn within the context of a real-life, complex project without worrying about mistakes directly impacting the project and also while allowing faculty members to reset the project as needed.

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

Clearly artificial intelligence is having a powerful impact on education and computing education in particular. Students and professionals alike will now have far more information at their fingertips than at any prior time in history. In addition, the rate of information generation and the rate of change are increasing. This acceleration in change and information generation means that education is going to have to shift from focusing on content to focusing on the skills students need to navigate this ever-changing world. Adaptability is going to be a critical skill. In addition, there is a need to focus on key skills such as critical thinking, problem solving, communication, and

teamwork. We need to encourage student characteristics such as curiosity, resilience and courage. Students will need to be engaged learners throughout their careers and we as instructors will need to instill this in our students. This will require a change in how we as faculty members teach.

In addition, as computing has an expanding and wide-spread global impact, there is a strong need to impart to students an understanding of the ethical and social impacts of computing. Computing applications can have global impact and students need to have a solid base of ethics and an understanding of the potential for computing to do both good and harm.

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

Many academic institutions are facing a number of challenges related to enrollments, student mental health, financial pressures and more. I think our main challenge is how to effect large-scale change in our approach to education in order to provide students with skills to pilot the rapidly changing information and technology landscape, in a university environment with increasing constraints.

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

DEI has been a problem in computing education for many decades now. I am encouraged to see the expanding volume of research in this area, as well as the growing number of organizations that are supporting DEI in computing education. NCWIT has been a driving force for increasing DEI since 2004 and I have found many of their resources helpful in outreach to high school students and current undergraduate students. I found great value in the Inclusive STEM Teaching Project, an NSF-funded online course with the goal of cultivating inclusive STEM learning environments. [Duke University's Cultural Competence in Computing](#) (3C) Fellows program educates faculty members on

how topics such as identity, bias, racism and discrimination play out in academic environments and The Alliance for Identity Inclusive Education (AiiCE) has a program for cohorts of faculty members to investigate how to create an equitable and inclusive academic environment in computing departments. And of course the University of Washington's AccessComputing has been demonstrating how to support accessible computing since 2006. These efforts are helping to address DEI challenges in useful ways that help change culture and are to be applauded. And replicated!

Results of research by our team have highlighted the potential for the social and humanitarian aspects of computing to be attractive to women and other underserved groups. In fact, the Society, Ethics and Professionalism (SEP) Knowledge Unit of the CS2023: ACM/IEEE-CS/AAAI Computer Science Curricula suggests that the social impact of computing be included in every other knowledge unit. One easy way that every faculty member can take a step towards creating a more inviting classroom environment is to situate assignments in a context that has a positive impact on society, to show the power of computing to "do good."

On a larger scale, as faculty members we all need to educate ourselves on what can be done to make all of our academic environments more inclusive. It is our responsibility to stay up to date on recent research and to participate in making education accessible to all. I see momentum picking up in this area and I am hopeful that such efforts will continue to expand.

**What do you enjoy doing when you are not working?**

I have a horse and ride dressage. I am hoping to be able to show her this year, at least locally. Riding is about as opposite an activity as you can get from computing and it is another arena in which I am constantly learning and growing.