

FY'21 ACM Education Board and Education Advisory Committee

For the Period: July 1, 2020 - June 30, 2021

Submitted by: Chris Stephenson and Elizabeth Hawthorne, Co-Chairs

Jane Prey, Immediate Past Chair

Mehran Sahami, Past Chair Emeritus

Executive Summary

This report summarizes the activities of the ACM Education Board and the Education Advisory Committee (EAC) in FY'21 and outlines priorities for FY'22. The membership of each organization is available from acm.org/education/education-governance. Below is a list of the Education Board's and EAC's major activities and accomplishments for this past year.

Curricular Volumes

In Progress:

- Computer Science 202X with IEEE-CS and AAI collaborators
- CC2020 visualization

Completed:

- Data Science 2020
- IS 2020
- CC 2020 Overview Report
- Cybersecurity Curricular Guidance for Associate-Degree Programs (Cyber2yr2020)
- Information Technology Transfer Curricula 2020 (IT-Transfer2020)

International Efforts

- Educational efforts in Europe/Informatics for All
- Educational efforts in China
- Educational efforts in India
- Educational efforts in Brazil

Current Task Forces and Other Projects

1. Diversity, Equity, and Inclusion in Computing Education (DEI-CE)
2. Standardization of ACM Curricula (StAC)
3. Actionable Computing Enrollment and Retention (ACER) Data Analysis
4. Education in Ethics and Computing
5. Resources for Instructors to Improve Teaching and Peer Mentoring Practices (EngageCSEdu)
6. NDC study
7. Learning@Scale conference
8. K-8 Computational Thinking Research Publication (partnership with Robin Hood Foundation)

Activities and Engagements with ACM SIGs and Other Groups

ACM Organizations:

ACM CCECC, ACM-W, ACM2Y, ACM India, ACM China, ACM Europe, SIGCAS, SIGCHI, SIGCSE, SIGGRAPH, SIGHPC, and SIGITE

Affiliated or External Groups

AAAI, AIS, ABET, Brazilian Computer Society, CSAB, CSforALL, CSTA, IEEE-CS, Informatics4All, National Science Foundation, NCWIT, NDC Committee

Future Initiatives for FY'22

- CS202X joint curriculum development effort with IEEE-CS and AAAI will continue
- EAC DEI-CE taskforce to collaborate with ACM D&I Council
- The final version of the CC2020 curriculum visualization tool
- Revised Bloom's Verbs project (list to incorporate more computing-oriented verbs)
- Launching ACM2Y
- Publish K-8 Computational Thinking research compendium.

Highlights

This is a very short list of the many accomplishments of the year. For full view of the work to date, please see Section One: Summary of FY 2020-2021 Activities.

Special Projects

EngageCSEdu:

The EngageCSEdu repository is up and running at ACM. The MOU between NCWIT and ACM detailing the agreement of full transfer of the resources was signed by both parties and the transfer of materials from NCWIT to the ACM digital library is complete. An editorial board and reviewer group have been established and ScholarOne is receiving submissions for review and publication.

Learning at Scale Conference:

The Learning at Scale (L@S) conference was created by the Education Board in 2014. Having shown a robust community, high-quality research, and financial viability, the meeting became an annual conference. Because of the continuing impact on travel from the coronavirus pandemic, the 2021 Learning at Scale (8th Annual) conference was held online June 22-25 with 244 virtual attendees.

NDC Study:

The ACM NDC Committee produces the annual ACM NDC Study of Non-Doctoral Granting Programs in Computing. This study complements the CRA Taulbee survey of doctoral-granting programs. The results of the 2020-2021 NDC Study have been submitted for publication in

December 2021 issue of ACM *Inroads*. This year both bachelor's and associate's degree data was included.

ACM2Y:

ACM2Y (acm2y.acm.org) is a start-up group in ACM for all who support computing education in two-year programs, such as those found at community and technical colleges in the U.S. and similar programs around the world. Mission Statement: ACM2Y advocates for a diverse group of computing students by building a targeted and resourceful community for faculty of two-year, higher education programs. The first event, a virtual panel, "From Pivot to Promise: Lessons Learned during COVID-19" was held on September 24, 2021.

K-8 Computational Thinking Research Compendium

This is a joint undertaking of the ACM Ed Board and the Robin Hood Foundation. The final publication (to be published and disseminated in late 2021) will be the first compendium of rigorous, peer-reviewed research on computational thinking education in grades K-8.

Curricular Initiatives

CS202X:

The Computer Science joint curriculum development initiative with IEEE-CS and AAAI is underway to update CS2013. MOUs have been signed and the joint steering committee has formed with members from each organization. The committee is diverse with representatives from different countries, and varying institutions types, genders, ethnicities, and CS expertise. The ACM and IEEE co-chairs are working closely with the EAC StAC task force to document the curriculum development process.

CC2020 Overview:

Computing Curricula 2020 (CC2020) is a joint project of multiple professional computing societies that examines the current state of curricular guidelines for academic programs granting degrees in computing and to provide a vision for the future of computing. The final report was approved by the ACM Education Board in January 2021. The final version of the visualization of the curricula is expected during FY'22.

Cyber2yr2020: ACM Guidelines for Associate-Degree Cybersecurity Programs:

Cyber2yr2020 won the *Innovations in Cybersecurity Education* award in the Program Development category from the National CyberWatch Center. Based on *Cyber2yr2020*, CSAB/ABET developed criteria for accrediting two-year programs in cybersecurity, which is a first for ABET's Computing Accreditation Commission. In 2021, ABET completed pilot visits with a handful of community colleges.

Data Science Curriculum:

This report defines the computing/computational contributions to the new field of Data Science in order to provide guidance for computer science or similar departments, offering data science/analytic programs of study at the undergraduate level. The final Data Science report

was approved by the ACM Education Board in January 2021. Dissemination efforts are underway.

IT Transfer: Curriculum Guidelines for Two-Year Transfer Programs in Information Technology: The Information Technology Transfer Curricula 2020: Curriculum Guidelines for Two-Year Transfer Programs in Information Technology was based on *Curriculum Guidelines for Baccalaureate Degree Programs in Information Technology (IT2017)*. This work was led by the ACM Committee for Computing Education in Community Colleges (CCECC) with participation from SIGITE. The final IT Transfer Curriculum was released in May 2020 and dissemination efforts are underway.

Diversity, Equity, and Inclusion

The Education Board and EAC have taken a two-pronged approach to our DEI work this year. We have continued to diversify both the Board and the EAC through the identification and appointment of faculty of color and provided a fast track for diverse EAC members to move into positions on the Board. We have also supported the work of our DEI-CE task force (see the DEI-CE report) including an in-depth training and workshop for the DEI-CE task force members and Ed Board co-chairs facilitated by Dr. Kelly Mack of the Association of American Colleges and Universities. We have also facilitated more opportunities to improve communication and alignment with the ACM D&I Council and the Systemic Change Committee and have brought in external experts (Dr. Allison Scott and Dr. Jane Margolis) to help us improve our understanding of issues of equity in CS education.

Education Board Priorities for Fiscal Year 2021 - 2022

- 1) Continue our efforts to ensure that the Education Board and EAC are more diverse and provide opportunities for leadership growth for diverse faculty.
- 2) Support the ongoing work of the Diversity, Equity and Inclusion in Computing Education (DEI-CE) task force and its efforts to better align its work with other DEI-focused organizations and initiatives across ACM.
- 3) Support the work of the StAC task force to standardize ACM Curriculum across the volumes of Computer Science, Information Technology, Cybersecurity, Data Science, Information Systems, Computer Engineering, and Software Engineering.
- 4) Support the ongoing work of the CS202X ACM/IEEE curriculum development committee.
- 5) Support the work of the Education in Ethics and Computing task force and their collaboration with *EngageCSEdu*.
- 6) Continue evolving the *EngageCSEdu* project, which is now part of the ACM Digital Library.
- 7) Support the ongoing work of the Actionable Computing Enrollment and Retention (ACER) data analysis task force.
- 8) Support the 2021 NDC analysis and ongoing study.
- 9) Complete K-8 Computational Thinking project with the publication and dissemination of the research compendium.

- 10) Continue to support the Learning at Scale conference.
- 11) Continue to support the CS2020 visualization project.
- 12) Continue to support the ACM2Y start-up group.

Section One

Summary of FY 2021 Activities and Accomplishments, and FY 2022 Next Steps and Future Plans

Education Board Strategic Priorities

The following are the strategic objectives for the Education Board (as agreed to by the Education Board and the Education Advisory Committee EAC).

- Provide a focus for ACM activity and leadership in the general area of computing education.
- Support ACM's strategic objectives through activities and initiatives in computing education; this includes providing support for ACM's various Councils.
- Understand the education related needs and aspirations of ACM members—students, academics, practitioners (and their managers) and employers—and respond appropriately on behalf of ACM.
- Provide leadership for the computing community in curricular development and curricular guidance; the community is to include all levels of secondary and post-secondary education with an emphasis on higher education, including two-year colleges.
- Where possible, act on behalf of the computing community to increase the status and standing of computing education.
- Recognizing ACM's role as an international organization, understand the differing needs of the international community and address these in Education Board and EAC considerations.
- Organize and manage meetings of the EAC, keeping committee members up-to-date with significant developments and generally managing the work of the committee and associated task forces.
- Approve ACM appointments to education-related bodies such as CSAB, ABET, and keep informed about and engage in significant related activity.

Current Priorities

The following priority areas were identified for 2021:

- Diversity, equity, and inclusion in computing education
- Standardization of ACM curricular guidelines (post-secondary levels: associate baccalaureate, and masters)
- Retention in computing (post-secondary levels: associate and baccalaureate)
- Ethics in computing education
- International outreach
- K-12 computing research
- ACM2Y

FY 2020-2021 Activities and Accomplishments

The current activities and accomplishments of the EAC are detailed below along with next steps and future plans for the coming fiscal year (FY'22).

Curricular Initiatives

CS202X:

The joint curriculum development initiative to update CS2013 in collaboration with IEEE-CS and AAAI is underway. MOUs have been signed and the joint steering committee has formed with members from each organization. The membership is diverse with representatives from different countries, and varying institutions types, genders, ethnicities, and CS expertise. The vision statement includes the creation of both a competency model and knowledge model with consistency/crosswalk between them. The competency model will be based on research from a 2022 ITiCSE working group that includes some members of the CS202X steering committee. The vision statement also includes a companion volume with the state of the practice and “living” curriculum. The steering committee is planning to send a survey to the international computer science education community for input. The committee has submitted a proposal for presentation at the 2022 SIGCSE conference, where the survey will also be disseminated. The ACM and IEEE co-chairs are working closely with the EAC StAC task force to document this curriculum development process.

CC2020 Overview:

Computing Curricula 2020 (CC2020) is a joint project launched by professional computing societies to examine the current state of curricular guidelines for academic programs granting degrees in computing and to provide a vision for the future of computing. The goal is to produce a comprehensive report and an online visualization tool that compares and contrasts these guidelines to situate and contextualize them in the landscape of computing education. The international project team represents organizations from academia, industry, and government. The final report was approved by the ACM Education Board in January 2021. The final version of the visualization of the curricula is expected during FY'22.

Cyber2yr2020: ACM Guidelines for Associate-Degree Cybersecurity Programs:

Cyber2yr2020 won the *Innovations in Cybersecurity Education* award in the Program Development category from the National CyberWatch Center. This award was publicly recognized at the 2020 virtual Community College Cybersecurity Summit (3CS) on August 4. Based on *Cyber2yr2020*, CSAB/ABET developed criteria for accrediting two-year programs in cybersecurity, which is a first for Computing Accreditation Commission of ABET. In 2021, ABET completed pilot visits with a handful of community colleges.

Data Science Curriculum:

This task force seeks to define what the computing/computational contributions are to the new field of Data Science, in order to provide guidance for computer science or similar departments offering data science programs of study at the undergraduate level. The final Data Science report was approved by the ACM Education Board in January 2021. Dissemination efforts are underway.

IT Transfer: Curriculum Guidelines for Two-Year Transfer Programs in Information Technology: The Information Technology Transfer Curricula 2020: Curriculum Guidelines for Two-Year Transfer Programs in Information Technology are based on *Curriculum Guidelines for Baccalaureate Degree Programs in Information Technology* (IT2017). IT programs should prepare students with knowledge, skills, and dispositions in IT professional contexts that emphasize development of IT competencies. The goal of the IT Transfer Curriculum is to produce a subset of the IT2017 curricular framework and guidelines that will guide how two-year colleges could structure their IT transfer programs to help prepare transfer students for successful upper division study in programs that implement the IT2017 guidance. This work was led by the ACM Committee for Computing Education in Community Colleges (CCECC) with participation from SIGITE. The final IT Transfer Curriculum was released in May 2020 and dissemination efforts are underway.

Projects & Task Forces

Learning@ Scale Conference:

ACM Education Board/EAC representatives: Mehran Sahami and Yan Timanovsky.

The Learning@Scale is the only conference managed by the Education Board. It was created by the Education Board in 2014. After a successful first outing (showing that there is a robust community, high-quality research, and financial viability) the meeting became an annual conference. Each year has had between 110-290 attendees. The 2021 conference was the eighth conference in this series.

| Year | Submissions | Accepted | Rate | Location |
|------|-------------|----------|------|--------------------------|
| 2014 | 38 | 14 | 37% | Atlanta, GA (SIGCSE) |
| 2015 | 90 | 23 | 26% | Vancouver, Canada (CSCW) |
| 2016 | 79 | 18 | 23% | Edinburgh, UK (LAK) |
| 2017 | 105 | 14 | 13% | Cambridge, MA at MIT |
| 2018 | 58 | 24 | 41% | London, UK (AIED+ICLS) |
| 2019 | 70 | 24 | 34% | Chicago, IL (AIED) |
| 2020 | 72 | 18 | 25% | Online |
| 2021 | 62 | 19 | 30% | Online |

The Eighth Annual ACM Conference on Learning @ Scale (L@S) was held online and hosted by the Hasso Plattner Institute in Potsdam, Germany on June 22-25, 2021 and was co-located with the EMOOCs 2021 Conference. There were 244 registrants, which is larger than prior in-person conference, but slightly lower than the 288 attendees the 2021 virtual conference. The higher

attendance numbers for the virtual conferences are likely due to lower registration fees than for in-person conferences as well as substantive savings on travel costs. The submissions numbers remained solid, with 63 submitted full papers, of which 19 were accepted for publication (a 30% acceptance rate, in-line with figures from recent years). The number of submissions was also in-line with recent prior conferences. See table above.

Future planning for the 2022 conference has progressed well. The current plan is for the 2022 conference to be held in-person at the Cornell Tech campus in New York City on June 1-3, 2022. A list of potential Program Chairs for the conference has been generated. The list needs to be narrowed and PC chairs invited in the near term. Additional steps, such as determining potential program committee members, discussing possible invited speakers, and generating the Call for Papers will take place shortly thereafter. In 2022, the conference will likely not be collocated with any other conferences.

The fundraising totaled \$8,000 plus conference registration of \$10,500 resulted in a surplus of \$8,400. Given surpluses from this conference and prior conferences (2014-20), L@S is projected to have a total surplus of roughly \$128,000 at this point. So, the conference remains financially viable.

NDC Study:

ACM Education Board/EAC representatives: Jodi Tims (Co-Chair), Stuart Zweben (Co-Chair), Yan Timanovsky (ACM Education Manager), and Cindy Tucker.

The ACM NDC Committee produces the annual ACM NDC Study of Non-Doctoral Granting Programs in Computing, complementing the CRA Taulbee survey of doctoral-granting programs. This annual survey provides data to the computing community on Degree Production, Enrollments, and Faculty from Associate's, Bachelor's, and Master's programs in Non-doctoral-granting Departments in Computing including demographic information by gender and ethnicity. This year's activities and accomplishments include:

- Produced 2020-2021 report, in final preparation for submission to the December 2021 issue of Inroads. (Data was not received from National Student Clearinghouse, NSC, until May, pushing publication from September to December). ACM has signed a master agreement with the NSC that will streamline data delivery and help avoid future delays.
- In addition to the usual Bachelor's level enrollment, graduation and faculty data, the 2021 NDC Study will incorporate enrollment and graduation data from NSC for U.S. Associate's level programs. The addition of Associate's level data adds an important element to our understanding of post-secondary academic computing programs, and is expected to be a regular feature of future NDC Study reports.

Next Steps/Future Plans include:

- Explore the feasibility of including associate's faculty data in the 2021-2022, as well as the feasibility of including Data Science in the 2021-22 study.
- Request 2020-2021 enrollment and graduates data from NSC in January 2022.

Actionable Computing Enrollment and Retention (ACER) Data Analysis:

ACM Education Board/EAC representatives: Zweben (Chair), Mihaela Sabin, Paul Leidig, Rodrigo Duran, Mark Weiss, and Cindy Tucker.

This task force is continuing and extending the previous work carried of the Retention in Undergraduate CS Education task force. Its purpose is to collect, analyze, and report annually to the computing community on enrollment and retention data in computing programs. This year's activities and accomplishments include:

- Published INROADS paper (June 2021) on retention in bachelor's and associate's programs in 2017-18 (Duran, Hawthorne, Sabin, Tang, Weiss, Zweben).
- Signed master agreement with National Student Clearinghouse.
- Did further work on candidate paper about 2017-18 non-retained students and graduates at next level of study (Zweben, Tang, Tucker, Weiss).
- Submitted paper to TOCE about factors affecting retention in Brazil (Duran & colleague).
- Obtained new data from NSC for 2018-19 (non-retained students and graduates at next level of study) and 2019-20 (retention).

Next Steps/Future Plans include:

- Complete and submit paper on 2017-18 non-retained students and graduates.
- Analyze 2018-19 data.
- Obtain data on 2019-20 non-retained students and graduates at next level and analyze.
- Write up suitable report(s) for publication based on 2018-19 and 2019-20 data.
- Discuss with NSC suitability of requesting Data Science data for 2020-21 enrolled students.

Education in Ethics and Computing:

ACM Education Board/EAC representatives: Bobby Schnabel (Chair), Tom Cortina, Christina Gardner-McClune, Mikey Goldweber, Vijay Kumar, Andrew McGettrick, Mehran Sahami, Olivier St. Cyr, and R. Venkatesh.

This task (formed in August 2018) undertakes activities that help the ACM community in conducting education in ethics and computing. This year's activities and accomplishments include:

- Building the initial repository of references (mainly media articles) related to ethics and computing.
- Collaboration with the EngageCSEdu project to have the repository materials as part of EngageCSEdu and conforming to their format and requirements.
- An initial version of the repository was demonstrated at the August 2021 EAC annual meeting to gather feedback.

Next Steps/Future Plans include:

- The immediate next step is to finish the first version of the repository.
- After that, that task force will develop plans to publicize it, gain use and feedback, and

- put in place a process for updating it annually.
- The ongoing sustainability is viable but requires a plan and likely modest resources.

Diversity, Equity, and Inclusion in Computing Education (DEI-CE):

ACM Education Board/EAC representatives: Fay Cobb Payton (Co-Chair) and Susan Reiser (Co-Chair), Andrew Williams, Armando Fox (on leave), Jake Baskin, LeighAnn DeLyser, Lisa Smith, Mary Anne Egan, Mehran Sahami, Ellen Walker, Beth Hawthorne, and Chris Stephenson.

This year's activities and accomplishments include:

- We established a liaison process between the DEI-CE Taskforce and the ACM Equity, Diversity and Inclusion Committee, co-chaired by John West and Natalie Enright. This enables us to have regular contact with the ACM D&I Council because there may be some synergistic interests.
- Lisa Smith joined the ACM D&I Council as a new co-chair per the request of the ACM leadership and stepped down from the EAC DEI-CE.
- Task force members completed extensive diversity training sessions with Kelly Mack and a final report was received from the facilitator.
- The DEI-CE has discussed action items from the Kelly Diversity Report and engagement with Curriculum Committee with a focus on language matters and codification.
- The task force hosted a meeting with Allison Scott and Jane Margolis on May 21 to discuss the CS education letter that appeared in *Medium*.
- The Taskforce also has discussed policy implications and/or revisions needed to address DEI in ACM SIGs, conferences, awards, officers, etc.

Next Steps/Future Plans include:

- Based on all of the information gathered during this past year, the task force is now considering its next project.
- An update will be provided to the Ed Board Chairs following that decision, including any budget requirements that may emerge.
- The task force will conduct a review and provide recommendations on the curricular content contained in the Social Issues and Professional Practice section of the CS202X Curriculum.
- If travel is deemed safe, we hope to meet in-person in late spring or early summer 2022.

Standardization of ACM Curricula (StAC):

ACM Education Board/EAC representatives: Cara Tang (Co-Chair), Mihaela Sabin (Co-Chair), R. Venkatesh (Venky), Paul Leidig, Ming Zhang, Diana Burley, Alison Clear, Itana Gimenes, Markus Geissler, Heikki Topi, Amruth Kumar, and Rajendra Raj.

This year's activities and accomplishments include:

- Crafted vision statement for new task force: develop standards and recommendations for ACM curriculum projects.
- Created a survey and collected input from past curriculum project chairs.
- Wrote a comprehensive draft of a report incorporating the survey results.

- Began collaboration with the co-chairs of CS202X curriculum project.

Next Steps/Future Plans include:

- Collect feedback on initial draft through focus groups.
- Incorporate feedback to write next draft of the report.
- Continue working with the CS202X co-chairs.

EngageCSEdu (previously the Task Force to Develop Resources for Instructors to Improve Teaching and Peer Mentoring Practices):

ACM Education Board/EAC representatives: Brianna Morrison (Co-Chair) and Michelle Craig (Co-Chair).

This year's activities and accomplishments include:

- LaTeX and Word Template are created and publicly available.
- ScholarOne is receiving submissions - currently 12 submissions out for review. One submission accepted and camera-ready received.
- Special Issue on HCI to be published Dec 2021 (8 of those 12 submissions).
- Special Issue on AI/ML/Data Science call for submissions is coming soon.
- First publication under ACM planned for September 2021.

Next Steps/Future Plans include:

- Working with Yan and ACM to sort out process for getting DOI and ACM reference format into the camera-ready paper portion of OER.
- Working with Yan and ACM to determine process to have papers added to ACM digital library.
- In discussions about a special issue on Parallel & Distributed Computing Unplugged.
- Continuing to recruit general submissions.

Committee for Computing Education in Community Colleges (CCECC):

ACM Education Board/EAC representative: Cara Tang (Chair) and Cindy Tucker.

This year's activities and accomplishments include:

- Progress on a revised Bloom's verbs list to incorporate more computing-oriented verbs. Through a poster presentation at SIGCSE 2021 and a survey that went out to various constituents the task force collected feedback on the first draft and are working on a second draft.
- SIGCSE 2021 presentations: BoF on community college topics in SIGCSE and ACM, poster on Bloom's verbs project.
- Kicked off ACM2Y, a membership group for those interested in computing education in two-year programs, by recruiting and forming a 10-member executive committee, chaired by Cara Tang.
- Collaborated with ACER taskforce to published an *Inroads* paper on retention data which includes associate program data. A second paper on unretained students is currently in draft.

- Keeping CCECC website up to date with relevant content and conducting outreach via social media and mailing list.

Next Steps/Future Plans include:

- Publish second draft of Bloom's verbs list, along with a brief report, and make available for public review and comment.
- Continue supporting ACM2Y to launch first event (tentatively in September) and promote the group and recruit members.
- Presence at conferences as in-person events resume, including SIGITE and SIGCSE; encourage community college participation, promote ACM2Y.
- Publish second paper on unretained students with ACER taskforce.
- Work with NDC taskforce to include data on associate programs in next NDC report and help determine feasibility of faculty survey for associate programs in future reports.
- Keep the CCECC website up to date with relevant content and conduct outreach via social media and educator mailing list.
- Update educator mailing list with current information.

Computer Science Teachers Association (CSTA):

ACM Education Board/EAC representatives: Jake Baskin CSTA Executive Director

Goal setting has been challenging due to pandemic related uncertainties. This uncertainty included all operations areas including PD, funding, and most especially our annual conference. Despite the uncertainty, we set out with ambitious goals to continue and expand our impact.

This year's activities and accomplishments include:

- We launched programming that reached thousands of teachers in new ways and supported our chapters in doing the same, implementing a monthly professional learning series with bite sized content for teachers to learn together, developing a model for day long summits on key topics in CS education in under a month, and kicking off regular meet-ups for members who don't have chapters close by. In all we held 47 total events with 2,154 total unique attendees, that's roughly one event a week, none of which we were offering a year ago.
- We added a mid-year chapter leadership summit.
- We developed a new chapter grant opportunities focused on equitable and inclusive teaching
- We received a substantial grant from the US Department of Education to implement CSPDWeek events.
- CSTA+ membership increased by 55%
- CSTA assumed ownership of CSEdWeek.
- We expanded our awards programs.
- The 2021 Annual Conference had 2,354 attendees (2,745 registrations), with 98.9% of attendees reporting that they were overall satisfied by the event, 99.4% reporting that they learned something they'll implement over the school year, and 100% reporting that CSTA pushes the field of CS Education forward. The conference also was a financial

success for the organization. It was our 4th consecutive conference to set a record for net revenue for the organization.

- All of this growth was noticed by the funding community, leading to CSTA's most successful fundraising year ever. Overall we secured over \$12MM in new funding commitments across corporate partnerships and federal grants, providing stable multi-year funding streams for the organization.

Next Steps/Future Plans include:

- CSTA is developing our annual goals for the 2021-22 program year. We will continue our focus on our key pillars of work:
 - Building Strong Communities
 - Delivering Ongoing Professional Learning
 - Providing Independent Guidance
 - Ensuring and Operational Foundation
- We're excited to continue our virtual summits next year, with the first one kicking off on Sept 18 with our *Cultivating a Community of Learners* summit. We're already beginning to plan for a first ever in person volunteer summit in February (covid permitting) and the 2022 CSTA Annual Conference in Chicago!

International Education Initiatives

Educational Initiatives in Europe/Informatics for All:

ACM Education Board/EAC representatives: Judith Gal-Ezer and Andrew McGettrick

The Informatics for All (Inf4All) Steering Committee: chaired by Wendy Hall, currently comprises four member organizations: (1) ACM Europe; (2) CEPIS, the Council of European Professional Informatics Societies; (3) IFIP Technical Committee 3 on Education; and, (4) Informatics Europe. Our focus is to provide support to the European Commission in terms of advancing informatics education, monitoring and being engaged in developments involving PISA as OECD prepares for its next assessment of science education, and supporting the ITiCSE (Innovation and Technology in Computer Science Education) conference. This year's activities and accomplishments include:

- To support a pan-European advancement of informatics education, an eight-member subgroup has been set up to produce an Informatics Curriculum Framework. This group includes 2 representatives from each of the 4 member organizations. This Framework will offer guidance and challenge to those designing curricula.
- An interim report, entitled *Informatics Curriculum Framework for School* has been produced and circulated for review. The review process closed September 15, 2021.
- Teacher Education: The education of teachers within Europe is an important topic for *Informatics for All* to address and of particular importance in terms of the implementation of the ideas in the report. Jake Baskin from CSTA (the Computer Science Teachers Association) and Julia Adamson from the BCS provided very valuable input.

Next Steps/Future Plans include:

- Incorporate responses into the next iteration of the Informatics Curriculum Framework.

- Consideration is being given to holding a further Workshop where teacher education would form the main agenda item. The current thought of a virtual event has considerable attractions in terms of both cost and reach.

Educational Initiatives in China

ACM Education Board/EAC representative: Ming Zhang.

This year's activities and accomplishments include:

- ACM SIGCSE China was established in 2016 and is chaired by Ming Zhang (Peking University). It now has 642 members. <https://china.acm.org/SIGCSE/>.
- CECC 2020, Computer Education Conference of China was held in Xiamen, Dec. 19-20, 2020.
- The ACM Turing Celebration in China was held July 31 – August 1, 2021 in Hefei, China. The conference had a 21% acceptance rate in 2021 and 32% acceptance rate in 2020. TURC 2020 was postponed to 2021 due to the global coronavirus pandemic.
- FCES 2020 (Future Computing Education Summit) was held both online and in-person in Dongguan, Guangzhou, July 18-19, 2020. There were 4 plenary keynotes, 2 panels, 7 sessions, 46 speakers, 23000+ attendees.
- IWCE 2020 (International Workshop on Computing Education) was held August 22, 2020.
- *The Impact of the ACM/IEEE Computing Curricula CC2020 on the Computer Specialty Setting in China*, by Ming Zhang, Juan Chen, Fei Han, Chunxiao Yang, Xi Wu was published in Communication of CCF, 2020, pages 32-37.

Next Steps/Future Plans include:

- Translate ACM/IEEE CC2020 into Chinese.
- Begin work on computing for new engineering, medical, agricultural, and liberal arts education.
- Continue to connect to the global computing education society.

Educational Initiatives in India

ACM Education Board/EAC representatives: R. Venkatesh and Abhiram Ranade (new to EAC).

- The committee has continued its focus on contributing to undergraduate curriculum development, teaching subjects, and bringing computing to schools. In 2018, India started summer schools on specific areas, aimed at encouraging students to undertake research in those areas. India also organized five summer schools. We have been holding regular workshops on teaching programming, setting exam papers and evaluation, and curriculum.
- *CSPathshala* (the national education initiative of computational thinking) has reached more than 850 schools and our recommended curriculum has been adopted by government-run schools.
- COMPUTE 2020—the 13th annual international symposium on education research—was held virtually on 09th - 12th December, 2020 at the Visvesvaraya National Institute of Technology Nagpur, Maharashtra, India. Recordings available. <http://www.acm->

compute.in/2020/

Next Steps/Future Plans include:

- Continue increasing the number of schools participating in *CSPathshala*.
- Continue education webinars for both students and faculty.
- Continue programming course task force.
- COMPUTE 2021 will be held on 18th - 20th November, 2021, University of Delhi, Delhi, India. <https://event.india.acm.org/Compute/>

Educational Initiatives in Brazil

ACM Education Board/EAC representatives: Itana Gimenes, Education Director of the Sociedade Brasileira de Computação (the Brazilian Computing Society).

This year's activities and accomplishments include:

- SBC conferences in 2021 are still in online mode - including the Computing Education Workshop (WEI) - last July. <https://sol.sbc.org.br/index.php/wei>
- A new Brazilian Computing Education Symposium (Educomp) with more of a research focus took place in April, 2020. This event was more research-oriented. <https://sol.sbc.org.br/index.php/educomp>
- Current challenges include the fact that Brazilian Universities' calendars are very diverse and Brazilian research continues to be threatened by reduced funds and scholarships, and the general lack of education planning.

Next Steps/Future include:

- Develop plan to attract and retain/reduce drop out of young people to computing courses and career: survey and statistics.
- Establish task force to develop programs guidelines for Cybersecurity, Data Science and Artificial Intelligence.
- Establish task force to develop activities to help address the critical shortage of IT professionals. Unfortunately collaborating with industry is difficult.
- The task force on introducing computing into basic education has advanced for approval to the Government Education Committee. Approval expected in 2022.

SIGs Educational Reports

SIGCAS

ACM Education Board/EAC representatives: Mikey Goldweber and Alison Clear.

SIGCAS addresses the social and ethical consequences of widespread computer usage. SIGCAS' main goals are to raise awareness about the impact that technology has on society, and to support and advance the efforts of those who are involved in this important work. This year's activities and accomplishments include:

- Published *CSG-Ed Resources for Further Reflection on Diversity and its Role in Computing*, available from <https://www.sigcas.org/csged/reflecting-on-the-role-of-diversity-in-computing-and-society-resources-from-csg-ed/>
- Members of SIGCAS assisted in proposing a successful pre-symposium all-day event at SIGCSE. The first half of the day was focused on incorporating the use of Humanitarian Free Open Source Software (HFOSS) projects into the classroom. The second half was focused on educating attendees on incorporating CSG-based assignments throughout the undergraduate curriculum Ethics (w/COPE).
- Presented a virtual SIGCAS Showcase, September 9 and 10, 2021.
- SIGCAS runs an active social media presence (primarily Twitter) focusing on ethics.

Next Steps/Future Plans include:

- Collaborate with other ACM SIGs on issues relating to Computing for Social Good-Ed focus (including HFOSS and ethics focus). <https://www.sigcas.org/csged/>
- Submit a pre-conference workshop to SIGCSE 2022.
- Interested in running workshops at regional educational conferences with other SIGs.

SIGCHI

ACM Education Board/EAC representative: Olivier St-Cyr.

ACM SIGCHI is the leading international community of professionals interested in research, education and the practical application of human-computer interaction. <https://sigchi.org/>.

This year's educational activities and accomplishments include:

- The Human-Computer Interaction (HCI) Community of Practice (CoP) has 416 members as of August 2021 and currently lives on Facebook. <https://www.facebook.com/groups/HCI.Education>.
- The HCI Living Curriculum project at <http://hclivingcurriculum.org/> aims to create a "living curriculum" focused on community connection, resource sharing, case studies, and showcasing and developing HCI principles and approaches in emerging technology domains.
- Two special online sessions for our CoP members in were conducted during the summer of 2020: (1) Teaching HCI Online and (2) Diversifying HCI Curricula.
- Working on a special issue of *Frontiers in Computer Science: Teaching and Learning Human-Computer Interaction (HCI): Current and Emerging Practices*.
- The 2020 and 2021 EduCHI symposia were held online due to the coronavirus pandemic, <https://educhi2020.hclivingcurriculum.org> and <https://educhi2021.hclivingcurriculum.org/>
- The SIGCHI Executive Committee recently created a task force to define priorities related to HCI Education over the next three years. (COVID-19 shas lowed down the efforts of this task force.)

Next Steps/Future Plans include:

- In early 2021, we entered into a partnership and pilot project with *EngageCSEdu* to develop a repository of Open Educational Resources (OER) on HCI. If this pilot is judged

successful, we hope to permanently establish our HCI Living Curriculum within *EngageCSEdu*.

- Full papers from the special issue of *Frontiers in Computer Science* will be sent for peer review in the fall 2021 and the special issue will be published in December 2021 or January 2022.
- Will plan the EduCHI 2022 symposium, to be held (if accepted) at the CHI 2022 conference in New Orleans, LA, on April 30 – May 6, 2022. We also plan to eventually move EduCHI to a stand-alone conference.

SIGCSE

ACM Education Board/EAC representative: MaryAnne Egan.

SIGCSE provides 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. <https://sigcse.org/>. This year’s educational activities and accomplishments include:

- We continued work on making changes to the leadership and governance processes for our conferences. ITiCSE, ICER, and the Technical Symposium all have steering committees to manage the direction of the conferences including recruiting and supporting conference committee members. The conferences held during 2021 were:

| Conference | Location | Attendees | Paper Acceptance |
|---------------------|----------|-----------|------------------|
| Technical Symposium | Virtual | 1756 | 31% |
| ITiCSE | Virtual | 380 | 29% |
| ICER | Virtual | 253 | 19% |

CompEd is scheduled to take place in India in 202x as soon as it is safe to travel.

- SIGCSE now supports two doctoral consortia, one at ICER and one at ITiCSE (supported in conjunction with ACM Europe and Informatics Europe). We funded seven special project grants and a pre-symposium event for SIGCSE Committee on Computing Education in Liberal Arts. (SIGCSE Travel Grants were suspended for the virtual conference this year and will resume for travel to the Technical Symposium 2022 in Providence, Rhode Island.)
- The DEI Committee-in-progress held their first information session at the Technical Symposium and is recruiting for membership to help set the charter and agenda.
- The Technical Symposium also included a workshop for Department chairs and an event to discuss improving geographic diversity at the Technical Symposium.
- We funded 7 special project grants, including “Telling Our Narratives: Expanding Equity within Computing Education.”
- Three annual SIGCSE awards were given:
 1. The Test of Time Paper

2. Outstanding Contribution to CS Education
3. Lifetime Service to the Computer Science Education Community.

Next Steps/Future Plans include:

- Given the state of international (or national) travel, the SIGCSE Board is working with the conference committees to manage the move to virtual in a positive way that retains the character of the conferences.
- All of the conferences have experienced tremendous growth over the past few years, with the move to virtual increasing “attendance” even more. We will continue to work with the conference committees to ensure the integrity of the conferences while balancing the health and safety of the participants.
- The SIGCSE Board surveyed the community to help us understand what the community wanted in terms of virtual conferences and virtual participation for all of our events.

SIGGRAPH

ACM Education Board/EAC representative: Susan Reiser

The SIGGRAPH Education Committee works to support educators in computer graphics and interactive techniques. The committee undertakes a broad range of projects and activities in support of the multidisciplinary (computer science, engineering, art) education community, such as developing curriculum guidelines, providing instructional resources, organizing SIGGRAPH conference-related activities and outreach. <https://siggraph.org/> and <https://education.siggraph.org/>. This year’s educational activities and accomplishments include:

- Barbara Mones leads the committee’s curricular work on XR (VR, AR, and MR) as Immersive Media Literacy. Her work was recognized when she was named the 2021 Distinguished Educator.
- Google’s Search Console reports that from June 1, 2020, through May 31, 2021 the education.siggraph.org website had 2,840 “clicks”, and 131,000 “impressions”—when the site appeared in the search results. The web site is updated regularly and social media (facebook; twitter; instagram; linkedin) remained active during the pandemic. The current Drupal site is being migrated to Wordpress, SIGGRAPH’s preferred CMS.
- There have been several additions to the cgSource repository for educational materials. Most notable is the publication of the first two curated graphics curricular lists.
- SIGGRAPH 2021’s virtual conference will offer 24 courses, 172 technical papers, a DEI Summit spread over two weeks. There are also 6 Hands-on courses called Labs, VR Theater performances, poster sessions, BOFs, a job fair, production sessions, art papers, emerging technology, and the art gallery. The BOFs are available with Basic Registration, which with the code SIGGRAPHSAVINGS is free.
- SIGGRAPH 2021 began asynchronously August 2nd and was held synchronously, albeit virtually, August 9th-13th.
- To support K-12 educators, we added a K-12 representative to the committee to help identify opportunities, particularly emphasizing career exploration.

Next Steps/Future Plans include:

- The Educators Forum—SIGGRAPH content tagged as being particularly relevant to Educators—is designed to be accessible with 11 on-demand presentations available beginning on the 2nd and synchronous content including Q&A’s for the on-demand sessions during the main conference week. The traditional Educator’s Meet and Greet, the Education Booth, and education BOFs will also be offered virtually.
- SIGGRAPH Asia is scheduled December 14-17 and, at this point, plans to be in-person in Tokyo.
- Eurographics is scheduled April 25-29 in Reims France.
- We will contribute to the graphics and visualization knowledge area in CS202X.
- We will focus on developing infrastructure for ongoing year-round virtual engagement and are piloting several year-round events to strengthen and broaden access to our community through webinar resources, ongoing BOF group engagement, and virtual social networking platforms.
- Next year’s conference will be hybrid and the registration restructured to broaden participation from students and the international community.

SIGHPC

ACM Education Board/EAC representative: Steve Gordon.

SIGHPC is the first international group within a major professional society that is devoted exclusively to the needs of students, faculty, researchers, and practitioners in high performance computing. The HPC community includes a wide range of individuals and organizations engaged in studying, developing, teaching, and supporting high performance computers, storage, networking, and software. <https://www.sighpc.org/> and <https://sighpceducation.acm.org/>. This year’s educational activities and accomplishments include:

- Posting online diversity statistics of the 2017 Super Computing conference, <https://www.sighpc.org/diversity/diversity-at-sc>
- SIGHPC awarded Dr. Didem Unat as the 2021 ACM SIGHPC Emerging Woman Leader in Technical Computing. Dr. Unat is an assistant professor at the in the department of Computer Engineering at Koç University in Istanbul, Turkey.
- Dr. Rohit Zambre of the University of California, Irvine was awarded the 2021 Outstanding Dissertation Award for outstanding contributions to the design, development, and measurement of a new MPI+threads library for scalable communication of multithreaded applications on current supercomputers.
- Eleven students were awarded the ACM SIGHPC Computational and Data Science Fellowships for 2021. The 200 nominees spanned disciplines from mathematics and astrophysics to chemical engineering and agriculture. Of the eleven students named as winners this year, 73% identify as female, and 91% are underrepresented minorities in their country of study. They are pursuing MS and PhD degrees in a variety of applied fields.
- The SIGHPC Education Chapter organized workshops on HPC training and education at SC2020, ISC2021, and the PEARC2021 conference.

(<https://sighpceducation.acm.org/events.html>). The chapter has also continued to sponsor webinars on a broad range of education topics.

Next Steps/Future Plans include:

- ACM SIGHPC Computational & Data Science Fellowships for 2022. Nominations open on March 15, 2022.
- SC21 will be held in November 2021 in St. Louis, Missouri. The SIGHPC Education Chapter will again lead a workshop on HPC Education and Training at the conference. <https://sc21.supercomputing.org/>.
- Plans are being made to lead additional education workshops at upcoming national and international meetings.

SIGITE

ACM Education Board/EAC representative: Mihaela Sabin, Vice Chair for SIGITE Education.

SIGITE provides a forum for the interaction of practitioners, educators, and others in the field of Information Technology Education to exchange ideas and engage in activities that advance the knowledge of its members, the curriculum, teaching, and the development and transfer of innovative concepts and applications in technology and pedagogy. <https://sigite.org/>. This year's educational activities and accomplishments include:

- SIGITE continues to be financially stable and organizationally strong.
- It had 245 members in fiscal year 2020-2021 (compared to 277 in the previous year).
- The 20th ACM SIGITE Annual Conference took place virtually, October 7-9, 2021. There were 33 paper submissions (vs. 85 paper submissions in 2020), 18 papers were accepted (55% acceptance rate, vs. 67% in 2020). Other sessions include: 3 panels, 3 workshops, and 13 big idea talks to be presented as posters. Total submissions: 52 (vs. 118 in 2020). We believe that the pandemic has factored into a lower number of conference submissions this year. The University of Nebraska Omaha, who hosted the conference, did an amazing job of turning it into a fully virtual conference. All sessions and events went very smoothly and professionally. The online platforms and services (Zoom and Whova) worked very well. The number of attendees was the highest ever: 235 attendees (vs. 153 in 2020).

Next Steps/Future Plans include:

- The next 22nd ACM SIGITE Annual Conference is co-hosted by Brigham Young University and Utah Valley University, and it is scheduled to take place in-person (for the time being) at the Snowbird Resource, October 6-9, 2022.
- SIGITE will continue its successful practice of having a Standing Conference Planning Committee and of hosting the IT Department Chairs meeting at its annual conferences.

Education Board Rotation and EAC Rotation

The ACM Education Board and Advisory Committee rosters at the end of FY 2021 were as follows:

* denotes those whose term ended at the end of FY'21 and so are rotating off.

** denotes members who have resigned

New members for FY'22 are listed at the end of each category

Education Board:

| <i>Position</i> | <i>Member</i> |
|---------------------|--|
| Co-Chair | Chris Stephenson |
| Co-Chair | Elizabeth K. Hawthorne |
| Vice Chair | Alison Derbenwick Miller |
| Past Chair | Jane C. Prey |
| Past Chair Emeritus | Mehran Sahami |
| Members | Cara Tang Mihaela Sabin Andrea Danyluk** Andrew McGettrick Paul Leidig Michele Craig Briana Morrison R. Venkatesh |

NEW ED BOARD MEMBERS FY'22

Diana Burley (promoted from the EAC)

Fay Cobb Payton (promoted from the EAC)

| | |
|------------------|---------------------------------------|
| ACM Headquarters | Yan Timanovsky |
| Ex-Officio | Jake Baskin (CSTA Executive Director) |
| ACM D&I Liaison | Lisa Smith |

Education Advisory Committee:

| Member | Affiliation |
|--------------------------|--|
| Tom Cortina | Carnegie Mellon University |
| Diana Burley | American University (promoted to Ed Board) |
| Fay Cobb Payton | North Carolina State University (promoted to Ed Board) |
| Leigh Ann Delyser | CSforAll |
| MaryAnne Egan | SIGCSE rep; Siena College |
| Christina Gardner-McCune | University of Florida |
| Judith Gal Ezer | ACM Europe Council; The Open University of Israel |
| Armando Fox* | Berkeley |
| Mikey Goldweber | SIGCAS rep; Xavier University |
| Steve Gordon | SIGHPC rep; The Ohio State University (Emeritus) |

| | |
|------------------|--|
| Alvaro Monge | California State University, Long Beach |
| Chris Piech | Stanford University |
| Lisa Smith | Intel Corp. (promoted to co-chair ACM D&I Council & Liaison) |
| Andrew Williams | University of Kansas, School of Engineering |
| Itana Gimenes | Brazil: Universidade Federal de Minas Gerais – UFMG |
| Cindy Tucker | Bluegrass Community and Technical College |
| Andrew Peterson* | University of Toronto |
| Beth Quinn | NCWIT |
| Donna Reese | CSAB rep; Mississippi State University (Emeritus) |
| Susan Reiser | SIGGRAPH rep; University of North Carolina at Asheville |
| Mihaela Sabin | SIGITE rep, University of New Hampshire |
| Olivier St-Cyr | SIGCHI rep; University of Toronto |
| Bobby Schnabel | University of Colorado-Boulder; Ed Council Ethics Task Force |
| Jodi L. Tims | ACM-W; Northeastern University |
| Ellen Walker | Hiram College |
| Pat Yongpradit** | Code.org |
| Ming Zhang* | ACM China; Peking University |
| Stu Zweben | NDC Study; The Ohio State University (Emeritus) |

NEW EAC MEMBERS FY'22

| | |
|------------------|-----------------------------------|
| Abhiram Ranade | Indian Institute of Technology |
| Daryl Detrick | Warren High School |
| David Joyner | Georgia Tech College of Computing |
| Amruth Kumar | Ramapo College of New Jersey |
| Tamara Pearson | Spelman College |
| Christian Servin | El Paso Community College |
| Aimin Zhu | Google (China) |

EAC ADVISORS FY'22

| | |
|-----------------|---|
| Alison Clear | CC2020; Eastern Institute of Technology |
| Robert Schnabel | Ethics in Computing Education; University of Colorado-Boulder |

Section Two – Future Plans and Priorities

Education Board Priorities for Fiscal Year 2021 - 2022

During the previous fiscal year during the global coronavirus pandemic amazing progress was made on a number of fronts by our dedicated volunteers. Below is a list of twelve priorities for FY'22.

- 1) Continue our efforts to ensure that the Education Board and EAC are more diverse and provide opportunities for leadership growth for diverse faculty.
- 2) Support the ongoing work of the Diversity, Equity and Inclusion in Computing Education (DEI-CE) task force and its efforts to better align its work with other DEI-focused organizations and initiatives across ACM.
- 3) Support the work of the StAC task force to standardize ACM Curriculum across the volumes of Computer Science, Information Technology, Cybersecurity, Data Science, Information Systems, Computer Engineering, and Software Engineering.
- 4) Support the ongoing work of the CS202X ACM/IEEE curriculum development committee.
- 5) Support the work of the Education in Ethics and Computing task force and their collaboration with the *EngageCSEdu* project.
- 6) Continue evolving the *EngageCSEdu* project.
- 7) Support the ongoing work of the Actionable Computing Enrollment and Retention (ACER) data analysis task force.
- 8) Support the 2021 NDC analysis and ongoing study.
- 9) Complete the K-8 Computational Thinking project with the publication and dissemination of the new research compendium.
- 10) Continue to support the Learning at Scale conference.
- 11) Continue to support the CS2020 visualization project.
- 12) Continue to support the ACM2Y start-up group.