

By  
Yan Timanovsky

# DIGEST OF ACM EDUCATIONAL ACTIVITIES

Welcome to the latest installment of “EduBits,” your quarterly pipeline to new and exciting happenings in the world of ACM education. In this edition, we report on significant progress in the arena of cybersecurity education. Also, details on the second L@S conference and updates from the ACM Public Policy Office.

## *Cyber Science: An Emerging Discipline?*

At the joint Education Board and Council meeting in September 2014 under the new co-leadership of Mehran Sahami and Jane Prey, the notion of a potential emerging discipline—cyber science—was whispered by Andy Phillips, Academic Dean and Provost of the United States Naval Academy. A few months prior, a small group initiated the Cyber Education Project. “The Cyber Education Project (hereafter referred to as CEP) is an initiative supported by a diverse group of computing professionals representing academic institutions and professional societies to develop undergraduate curriculum guidelines and a case for accreditation for a baccalaureate in ‘Cyber Science.’ Organized in July 2014, CEP is currently leveraging a community of interest to inform and drive the work forward [4].” An evolving white paper called the Blair-Parish report was written in August 2014, and updated in October 2014, to start charting a path forward to facilitate an effort to 1) create broad/inclusive guidance for the development of cyber science curricula, and 2) foster the development of a new ABET program-specific accreditation criteria for cyber science.

Toward this effort, the three committees of CEP—learning outcomes, stakeholders, and accreditation—held information and working sessions at both the community meeting of the National Centers for Academic Excellence in Information Assurance/Cyber Defense [5], and the NIST NICE (National Initiative for Cybersecurity Education) conference in Columbia, MD, November 4-6, 2014 [9]. The small CEP team gathered names of volunteers to serve on each of these committees. Co-chairs lead each of the three committees. The charge of each committee is available for review online [4]. In addition, at the NICE conference, a panel session entitled “Cyber Science: Integration of Cyber Disciplines” was moderated by Dr. Victor Piotrowski, Lead Program Director, CyberCorps®: Scholarship for Service (SFS), NSF and Lead, NICE C2 - Formal Education. Well known and well respected cyber scholars served as panelists: Dr. Deborah Frincke, Director of Research, NSA; Dr. Eugene Spafford, Executive Director, CE-RIAS, Purdue University; and Prof. Howard Taylor, Visiting Professor, USMA. These three experts debated the merits of cyber science emerging as a new computing-based discipline. Conference attendees were anxious to hear the debate that ensued. The ballroom at the conference venue was standing room only. (See photo of audience and panelists.) One thing all three panelists agreed upon was that an adversarial mindset distinguishes cyber science from other computing disciplines, such as computer science and information technology.

The abstract from the NICE conference panel reads, “There is a general consensus that we are moving beyond traditional Computer Science, Information Technology, Information Systems, Software Engineering, etc. We need to define the scope of what Cyber Science

means by creating an appropriate taxonomy of cyber-related disciplines and then carving out a new discipline. Successful implementation of cyber risk mitigation requires the development and maintenance not only of technical competencies, but the inclusion of a variety of cyber-related disciplines. This panel will summarize existing relevant professional community efforts and the need for workforce participants who can successfully navigate the intersection of law, technology, and business in the cyber environment and to engage more comprehensively in all aspects of cyber planning, defense, privacy, and risk assessment, as well as more meaningful engagement with various regulators and agencies [10]."

A website [4] as well as an interactive community on the Ensemble Computing Portal [5] has been established for the cyber community to keep apprised of the progress being made by the members of the Cyber Education Project. The ACM Education Board and Council continue to discuss ACM's role as a professional society in this potential new discipline, called cyber science at least for the now.



Elizabeth K. Hawthorne

## ***Second Annual Learning @ Scale Conference Brings Together Computer Scientists and Learning Scientists***

The foremost researchers in the emergent field of Massively Open Online Courses (MOOCs) will gather March 14-15, 2015 in Vancouver, British Canada for the second annual Learning at Scale (L@S) Conference [7]. This conference is intended as a venue to promote scientific exchange of interdisciplinary research at the intersection of the learning sciences and computer science. Inspired by the growth of MOOCs and the accompanying shift in thinking about education, this conference was created by ACM as a new scholarly venue and key focal point for the review and presentation of the highest quality research on how learning and teaching can change and improve when done at scale.

Building on a successful first symposium held in March 2014 in Atlanta, this year's conference is co-located with the 18th ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW 2015), offering the two communities a unique opportunity to interact [2]. General Chair Gregor Kiczales (University of British Columbia) and Program Chairs Daniel Russell (Google Inc.) and Beverly Woolf (UMASS Amherst) and their Program Committee have put together an exciting program. The opening keynote will be delivered by Zoran Popovic, Professor and Director of the Center for Game Science at the University of Washington and Founder and Chief Scientist at Enlearn. Peter Norvig, Director of Research at Google, Inc., will give the closing keynote, which will be open to CSCW attendees. Registration is still open. See website for program and other information. [7]

*And now, we turn to Renee Dopplick, ACM Director of Public Policy, for a roundup of major developments in computing education policy.*

## ***Global Innovation Index 2014 Rankings of Education Performance and R&D Funding***

Education, investments in research and development, and information technologies are important foundations to a country's economic growth and success in the competitive international marketplace, according to the Global Innovation Index 2014 [6]. The report's theme, "The Human Factor in Innovation," emphasizes the importance of growing a highly educated workforce, creating environments favorable to educating innovators, developing higher education systems, fostering knowledge-based economies, retaining top postsecondary graduates, and fostering inclusiveness in education and in the workforce. Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO), a specialized UN agency, published this annual report, a PDF copy of which is available for download [6].

Overall, the education, research, and knowledge-based economy indicators paint a hopeful picture for future innovation worldwide. The researchers report that they "see signs that the number and geographical spread of students, researchers, and entrepreneurs are rising" despite fiscal cutbacks to education spending in many advanced countries since 2010. They conclude that, "[i]f appropriately empowered, the more abundant and diverse skills and talent available worldwide to drive innovation can prove exceptionally effective."

The researchers report strong levels of research and development funding by the public and private sectors between 2010 and 2012, with the majority of countries continuing to grow research spending through 2014 when compared to the economic downturn in 2009. Going forward, research and development funding is projected to grow in Asia yet remain flat or reduced in the United States and some European countries.

The report provides country profiles, worldwide rankings, data tables with comparisons across countries, and case studies from India, the United Arab Emirates, and Morocco.

---

## ***U.S. Congress—Prospects for Education Legislation, Regulations, and Funding***

The 113th Congress wrapped up its final days by passing a trillion dollar federal spending bill to fund most of the government until the end of September and by passing five bills related to cybersecurity. Provisions in those bills call for continuation of the federal Cyber Scholarship-for-Service program, federally funded research into integrating cybersecurity in the core curriculum of computer science programs and related programs, and initiatives to evaluate and forecast future cybersecurity education programs at all levels.

Looking to break the federal education policy logjams of prior years, the new 114th Congress is ambitiously pursuing major education legislation with expectations of several floor votes this year. The Elementary and Secondary Education Act (ESEA), which would overhaul the No Child Left Behind Act (NCLB), serves as the first bellwether for the extent to which

bipartisan support can rally behind successfully advancing legislation this year. Congress is also anticipated to consider legislation that would reauthorize the Carl D. Perkins Career and Technical Education Act, the Higher Education Act (HEA), and the America COMPETES Act. Legislators likely will depend on and leverage previously crafted language that was discussed and debated last year. That prior bipartisan consensus-building could help accelerate getting several of these education bills to floor votes this year. These education bills collectively seek to strengthen K-12 education, provide basic and advanced teacher training, stimulate higher education, and foster highly qualified workers. Computing education stakeholders continue to work for having these legislative proposals address computer science and other computing-related education, research, and workforce development initiatives.

The U.S. Department of Education is considering proposed teacher preparation regulations under Title II of the Higher Education Act (HEA). The regulations would require teacher preparation programs to track data on graduates, including job placement and the performance of students taught by those graduates. Teacher Education Assistance for College and Higher Education (TEACH) grants would be linked to the performance of the programs. The draft regulations propose to define “high-quality teacher preparation” and what constitutes a “TEACH Grant-eligible STEM program.” The regulations seek to provide greater accountability, transparency, and incentives for better teacher training. In comments submitted to the regulators in February, some associations representing educators, colleges, and universities expressed agreement with the goals generally. Yet, they also expressed a number of concerns that the new regulations could: negatively impact the delivery of teacher preparation programs; raise the costs beyond the capacity of states or institutions to implement them; have a disproportionate impact on minority-serving institutions; link teacher prep student aid to the program’s performance rather than the student’s financial need and the institution’s accreditation; and potentially lead to fewer specialized educators entering into the teaching profession.

STEM (science, technology, engineering and mathematics) education and computing research and development made gains in the spending bill for federal fiscal year 2015 passed by Congress in December. Among the gains, Congress authorized an increase in funds for the National Science Foundation, new funds for state grants to improve teacher quality, additional funds for 21st Century Community Learning Centers, and new funds for a program to examine and develop models of intervention for improving K-12 STEM education and undergraduate programs. Despite these gains, long-term federal funding for STEM education and computing research and development remains uncertain. If sequestration restarts in fiscal year 2016, federal appropriators will be looking for ways to achieve substantial savings from annual discretionary spending, including from federal investments in education and scientific research. The Office of Management and Budget already has told federal agencies to cut at least 2% from their fiscal year 2016 budget requests. To keep the United States on a path to economic recovery, policy leaders will need to find the right balance between reducing the debt and investing public funds to grow education and R&D programs, both of which are vital to innovation-based growth.

## Europe—Computing Research Faces Funding Cuts

In response to announced cuts to Horizon 2020 funding and the launch of a new Investment Plan for Europe, ACM Europe submitted a letter to the European Commission and the European Council urging continued strong support for funding fundamental research in computing science [3]. Horizon 2020 funds innovative research and development in several areas of computing, including advanced cloud computing, cybersecurity, smart cyber-physical systems, the Internet of Things, robotics, and technologies for better human learning and teaching. The letter, signed by ACM Europe Chair Fabrizio Gagliardi, highlights the importance of the public funds, such as those available through the European Research Council grant program, in promoting fundamental research. Such research incentives serve as fundamental drivers for innovation and enhance European economic growth by nurturing and attracting top talent, enabling entrepreneurship, and creating an environment for technology transfers of research innovations to industry. ACM Europe recommends maintaining and possibly enhancing public funding levels for computing research.

ACM engages in education policy largely through the ACM Education Policy Committee [2]. The ACM Public Policy Office helps support that Committee and other ACM entities involved in computer science education and computing education as related to education policy. Do you have questions or comments for us? Contact us at: [acmpo@hq.acm.org](mailto:acmpo@hq.acm.org).



**Renee Dopplick**  
ACM Public Policy Office

### EduBits References

- [1] 18th ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW 2015); <http://cscw.acm.org/>. Accessed 2015 January 10.
- [2] ACM Education Policy Committee; [http://bit.ly/ACM\\_EdPolicy](http://bit.ly/ACM_EdPolicy). Accessed 2015 January 10.
- [3] ACM Europe Letter to the European Commission; [http://europe.acm.org/Letter\\_to\\_EUCommission\\_EUCouncil\\_Presidents.pdf](http://europe.acm.org/Letter_to_EUCommission_EUCouncil_Presidents.pdf). Accessed 2015 January 10.
- [4] Cyber Education Project; <http://cybereducationproject.org>. Accessed 2015 January 10.
- [5] Ensemble Computing Portal, Cyber Education Project; <http://computingportal.org/node/13622>. Accessed 2015 January 10.
- [6] Global Innovation Index 2014; <https://globalinnovationindex.org>. Accessed 2015 January 10.
- [7] Learning @ Scale 2015 (L@S 2015); <http://learningatscale.acm.org/>. Accessed 2015 January 10.
- [8] National Centers for Academic Excellence in Information Assurance/Cyber Defense; [http://www.nsa.gov/ia/academic\\_outreach/nat\\_cae/](http://www.nsa.gov/ia/academic_outreach/nat_cae/). Accessed 2015 January 10.
- [9] NIST NICE (National Initiative for Cybersecurity Education); <http://www.fbcinc.com/e/nice/>. Accessed 2015 January 10.
- [10] NIST NICE (National Initiative for Cybersecurity Education) conference agenda; [www.fbcinc.com/e/nice/ncec/agendagrid.aspx](http://www.fbcinc.com/e/nice/ncec/agendagrid.aspx). Accessed 2015 January 10.



**YAN TIMANOVSKY**  
Liaison to the Education Board  
ACM Headquarters,  
New York, New York USA  
[timanovsky@hq.acm.org](mailto:timanovsky@hq.acm.org)

DOI: 10.1145/2716318 Copyright held by authors.