ACM Education Board

Annual Report for FY 13

September 2013

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Annex A Roster of Education Board and Education Council Members
Executive Summary

This report summarizes the activities of the ACM Education Board and the Education Council in FY 2013 and outlines priorities for the coming year. Major accomplishments for this past year include the following:

- Undertaking a review of the current priorities of the Education Board and Education Council, leading to the inclusion of online learning and cybersecurity education.
- Making substantial progress on each one of the immediate priorities that the Education Board and the Education Council had deemed as important. The latter included, apart from the two new priority areas, supporting the ongoing development of CS2013, supporting the AP initiative and the related CS10k challenge, supporting an initiative in computing education with ACM India and addressing issues on statistics gathering (extending Taulbee with the TauRUs pilot surveys (now known as ACM-NDC).
- Supporting the ongoing evolution of PACE (Partnership for Advancing Computing Education).
- Supporting the Two-Year College Education Committee, the latter now being referred to as the Committee for Computing Education in Community Colleges (CCECC for short)
- Having oversight of the setting up of two separate committees to take forward the ACM-NDC Study project and the CS 10k challenge
- Supporting ongoing work on CS2013, the new computer science curricular guidelines
- Holding an Education Council meeting in Denver and using this to inform and to get guidance on ways forward
- Having succeeded in gaining an award from the National Science Foundation (NSF), holding a meeting about cybersecurity education and completing a report on the work
- Having completed investigations into the desirability of embarking on reviews of the current Software Engineering and Computer Engineering volumes, namely SE2004 and CE2004, initiating follow-up activity
- Broadening international participation in computing education activities; in particular the Education Board helped to set in motion discussions between SIGCSE and Informatics Europe about initiating a new high-profile annual computing education conference in Europe
- Continuing the work on reversing declining enrollments in computing disciplines and in the process fostering a positive image of computing among young people; a related problem of over-demand is now evident in some institutions
- Continuing to enhance the effectiveness of the Education Board and the Education Council
- Increasing the visibility of the Education Board and the Education Council within the community
- Having previously agreed to certain time limits for Education Board membership, there has been a significant update of the membership of both the Education Board and the Education Council

Challenges for FY 2014 include further development of many of last year’s activities:

- Continuing to make progress on each of the current priorities of the Education Board and the Education Council
- Continuing to evolve arrangements associated with the development of both the Education Board and the Education Council, including their membership
- Continuing to support the final stages of the development of CS2013, leading to its approval by ACM Council and its publication in the latter part of 2013; the question of what will be needed by way of follow-up activity will need to be considered
- Reflecting on follow-up to the cybersecurity study
- Continuing to support K-12 activity and the related CS10k challenge
- Increasing international activity, and in particular progressing an initiative with ACM India and supporting any new computing education conference in Europe
- Supporting the CCECC and in particular its IT initiative
- Supporting the launch and the further development of PACE
- Supporting the interim reviews of publications in both software engineering and in computer engineering in conjunction with the Computer Society
- Launching a review of the Information Technology guidelines in conjunction with SIGITE; examining the wisdom of having separate IT and IS volumes – this will need to involve the Education Board, AIS and SIGITE
- Investigating a request to launch a Master’s-level review of guidance on Information Systems
- Increasing web-based support for the community to keep them more involved with curriculum development
- Noting the outcomes of the ACM-NDC report and considering relevant action; also continuing to support ACM-NDC
- Further extending the leadership role of the Education Board and the Education Council
Section One

Summary of FY 2012 Activities

1.1 Education Board strategic priorities

It seems relevant to begin with some background about the Education Board and the Education Council to provide some context for its activities.

At the ACM Council meeting in October 2010 there had been considerable discussion about many aspects of computing education. It was suggested that the Education Board might find benefit in giving consideration to the identification of a set of strategic priorities for their work. The Education Board duly considered this at its meeting in Seattle on 10th and 11th December 2010.

Any discussion about strategic priorities had to be seen in the context of the Charter of the Education Board, namely

The ACM Education Board – its Charter

Scope
The general scope of the Education Board is to promote computer science education at all levels and in all ways possible. The Board will be an executive-like committee overseeing the Education Council and will initiate, direct, and manage key ACM educational projects. This includes activities such as the promotion of curriculum recommendations, the coordination of educational activities, and efforts to provide educational and information services to the ACM membership.

The Board will oversee the work of the Education Council. This body will include representatives of all ACM committees concerned with accreditation, curricula, aid to educational institutions, and other educational activities.

1.1.1 Strategic objectives

The following were identified as strategic objectives for the Education Board (and these were later agreed to by the Education Council at its meeting in Miami in February 2011):

- To provide a focus for ACM activity and leadership in the general area of computing education
- To support ACM’s strategic objectives through activities and initiatives in computing education; this includes providing support for ACM’s various Councils
- To understand the education related needs and aspirations of ACM members – students, academics, practitioners (and their managers) and employers – and to respond appropriately on behalf of ACM
- To provide leadership for the computing community in curricular development and curricular guidance; the community is to include all levels of education (specifically including K-12 and two-year college activity) with the emphasis being on higher education
- Where possible to act on behalf of the computing community to increase the status and standing of computing education
- In recognizing ACM’s role as an international organization, to understand the differing needs of the international community and to address these in Education Board and Education Council considerations
- To organize and manage meetings of the Education Council, to keep the Council members up-to-date with significant developments and generally to manage the work of the Council
- To approve ACM appointments to education-related bodies such as ABET, and to keep informed about and engage in significant related activity

1.1.2 Current priorities

At the Seattle meeting of the Education Board in December 2010, certain priority areas for the Education Board had been agreed, namely
The effort to produce the next Computer Science volume, referred to as CS2013
The Advanced Placement initiative and the related CS10k challenge, i.e. the challenge of producing for the US 10k teachers properly qualified to teach to the new curriculum
Certain international initiatives and in particular an initiative involving ACM India was being considered

It was also felt that thought should be given to gathering statistics about the uptake and state of computing in all institutions of higher education; currently the Taabbee report addresses this but only for selected (the top research) institutions.

Considerable progress had been made on all these areas and it was felt timely to review these. At a meeting of the Education Board in January 2013, it was felt important to keep these areas in view but to add two additional areas: online learning and cybersecurity education.

1.2 Education Council activities

1.2.1 Updating the membership of the Education Council/Board

The Education Board and the Education Council have been in existence now since 2006. In its present incarnation, the Education Council is internal to ACM and contains representatives of all significant educational interest within ACM. Thus:

- All members of the Education Board are automatically members of the Education Council
- Those SIGs with significant educational activity have a formal representative on the Education Council (SIGCAS, SIGCHI, SIGCSE, SIGITE, SIGGRAPH, SIGPLAN)
- There are representatives of CSTA, the CCECC, the Education Policy Committee
- Representatives from ACM India and ACM China
- Industry representatives
- Certain ABET/CSAB and accreditation representation is included
- Certain people are included because of the distinctive contribution they make to computing education (e.g., NSF Distinguished Educators)
- Additional SIGs and other representatives are included

In making decisions about the phrase “significant educational activity,” activity such as an education strand or theme within an annual conference qualify, or the existence of an education officer. The updated membership of the Education Council is included in Annex A.

Membership of the Education Board itself had to be addressed. The Education Board has now taken the decision that membership of the Board should be limited to at most two terms of three years, and some “refreshing” of membership had taken place.

1.2.2 Education Council meetings

In accord with the arrangement (entered into at the EC budget meeting in February 2007) that there should be one Education Council meeting every eight months approximately, there was just a single meeting of the Education Council in FY 2013.

Denver meeting

The eleventh meeting of the Education Council meeting took place at the Sheraton Hotel, Denver on 9th and 10th March 2013 immediately following SIGCSE 2103. The program for the Ed Council meeting included updates on ACM from John White, from the Computing Education Policy Committee; from the AP and CS 10k activities; from selected SIGs (SIGCAS, SIGCHI, SIGCSE, SIGITE, SIGGRAPH and SIGPLAN), and from CSAB. Importantly also there were updates from both the ACM India Council by Mathai Joseph and from the ACM China Council by Ming Zhang. There were also presentations on current projects, notably CS2013, ACM-NDC and the cybersecurity study. In addition Peter Norvig gave a presentation on Online Learning within Google and there was also a presentation from Hadi Partovi, who flew in from Seattle to give a special presentation on code.org, which was having a huge impact on the education scene within U.S., a matter that had been reflected at the
SIGCSE 2013 Symposium.

An important conclusion from the meeting was that there should be follow-up on the work on online learning and the idea that the Education Board should seek to promote a symposium on online learning was hatched.

1.3 The Future of Computing Education Summit

The Future of Computing Education Summit (FoCE) took place in June 2009 and the report on this appears at: http://www.acm.org/education/future-of-computing-education-summit/. There had been encouragement for the formation of a new body to focus on information gathering, coordinating, connecting, and encouraging but not to take on responsibility for such matters as curriculum development. Accordingly PACE, the Partnership for Advancing Computing Education, had been set up.

1.3.1 PACE – Partnership for Advancing Computing Education

At an inaugural meeting in Washington DC on 26th April 2011, PACE came into being (previously it had been referred to as CECC, the Computing Education Coordinating Committee). The member organizations present were ACM, the Association for Information Systems (AIS), the Computer Society (IEEE-CS), the Computer Science Teachers Association (CSTA) and the National Center for Women & Information Technology (NCWIT). Since that time CRA has joined as well.

All five of the present institutions agreed to be founding members of PACE. The Administrative Director would be Mark Guzdial (member of the Ed Council) and he would have responsibility for coordinating the growth and development of PACE. The chair of the PACE Board of Directors would be Lecia Barker (NCWIT) with Andrew McGettrick (ACM) as Vice-Chair.

To provide a brief overview of PACE:

- **Goals and Objectives**
  - High quality, diversity, and capacity of the computing workforce
  - High quality of computing education at all levels
  - Increased stability of enrollments at levels compatible with demands

- **Membership provides opportunities to**
  - Advance the state of computing education
  - Share strategies and innovations
  - Build partnerships to support and enhance current and new initiatives
  - Reduce expense and increase impact

A meeting of the PACE Board took place at the CRA offices in Washington DC on 7th and 8th May 2012. At that meeting possible collaborations were discussed including the Computer Society becoming involved in CS Ed Week and AIS exploring joining Computing-in-the-Core. The funding from NSF, which is residue from the original FoCE support, has been extended for another year and each organization contributes $1,000 annually to cover meeting expenses.

A more recent meeting took place again at the offices of CRA in Washington DC on 2nd August 2013. Present were PACE Administrative Director Mark Guzdial; from ACM, Andrew McGettrick and Heikki Topi; from AIS, Keng Siau and Jason Thatcher; from CRA-e, Andy Bernat; from CSTA, no representatives; from IEEE-CS, Ann DeMarle and David Alan Grier (current President of the Computer Society); from NCWIT, Lecia Barker and Catherine (Kitty) Didion. Lecia was reappointed as Chair and Andrew as Vice-Chair.

Jane Prey from NSF also attended part of the meeting. Apart from sharing information about progress amongst the various attendees, in the end the meeting was dominated by comments from Jane who expressed the wish to see a submission from the PACE Board to undertake a project to identify issues related to Computing Education Research. She had expressed the wish to see a landscape study: what is the landscape of computing education research, what had been addressed and what had not been addressed by the community. This arose out of a certain frustration within NSF about involvement of computing faculty in responding to calls and a wish to see the computing research community extended
and re-invigorated. A proposal has been drafted and submitted to NSF. It was anticipated that a workshop would be convened, and that this would be hosted by Kitty Dideon (in her role as a representative of the U.S. National Academy of Engineering).

1.4 Supporting K-12 computing efforts

1.4.1 Developments involving AP

The ongoing discussions about the AP Computer Science exams are important for computing in the U.S. A new AP CS Principles course curriculum has been devised, and has undergone various phases of piloting. See http://csprinciples.org/. The Principle Investigator on this is Owen Astrachan from the Education Council but the work generally is supported by other members of the Education Council, in particular Mark Guzdial, Dan Garcia, Deepak Kumar, Eric Roberts, Larry Snyder and Chris Stephenson. Jan Cuny (Education Council) has been a key player in guiding and promoting these developments. In short, members of the Education Council are playing a vital role in making this happen.

1.4.2 The CS10k challenge

The challenge of supporting the development of 10k teachers and equipping them to be able to teach the new CS Principles course is vital to the success of ongoing developments at the high school level. During the year funding was obtained from NSF and Google to help with this. A committee composed of Jan Cuny, Dan Garcia, Mark Guzdial, Eric Roberts, Larry Snyder, Cameron Wilson and Chris Stephenson is taking this forward.

1.4.3 Additional considerations

Fostering a positive image of computing among young people

One of the factors that had contributed to the enrollment crisis was that young people did not see existing programs of study in computing as being sufficiently attractive or offering attractive career opportunities.

Grady Booch had given an inspiring keynote address at SIGCSE 2007, in which he talked about the need to rediscover the wonder and awe of computing and to make its joys more evident to the next generation. At subsequent SIGCSE symposia members of the Education Council (led by Dan Garcia from the Education Board) have put forward submissions for special panel sessions that would build on this. Their sessions on the general topic of Rediscovering the Passion, Beauty, Joy and Awe: Making Computing Fun Again have attracted considerable audiences and they were typically deemed to be one of the successes of these conferences.

Curriculum considerations

It has seemed clear that any action plan related to computing education needs to include a campaign of some kind to foster positive images of the discipline among young people. That campaign would have to involve developing new curricular offerings that hold greater appeal and greater promise. Individual members of the Education Board/Council have developed ideas in this regard and they are experimenting in order to gain a better understanding of the factors that shed light on the situation or contribute to success. The metrics for success in this endeavor must include both increased admissions and increased retention rates in degree programs.

1.5 Report from the Committee for Computing Education in Community Colleges (CCECC)

Dr. Elizabeth K. Hawthorne, CCECC Chair, provided the following report on the activities of the ACM CCECC. Annual reports of the CCECC are available online from http://www.capspace.org/committee/annualreports.aspx.

The Committee charter and purpose: The ACM Committee for Computing Education in Community Colleges is the standing committee of the ACM Education Board concerned with computing education at associate-degree-granting colleges and similar post-secondary institutions throughout the world. The
Committee advises the Education Board as directed on all issues concerning curriculum, pedagogy and assessment, and engages in advocacy and policy for this sector of higher education.

For CCECC membership see http://www.capspace.org/committee/History.aspx. Also see http://www.acmcccecc.org/ (or http://www.capspace.org/).

The CCECC achieved the following milestones in FY13 (July 1, 2012 – June 30, 2013):

- Appointment of CCECC full members
  - Prof. Cindy Tucker, Associate Professor, Bluegrass Community and Technical College
  - Prof. Jim Nichols, Division Director, Estrella Mountain Community College
  - Dr. Cara Tang, Instructor, Portland Community College

- Ongoing development and maintenance of CAP Space, an online repository of curricula, assessment and pedagogy resources – http://www.capspace.org/.
  - Populated Affiliate Database with nearly 5,000 confirmed computing educators in two-year college institutions; created a variety of associated electronic processes to maintain and utilize this database effectively
  - Developed zip code radius searching and retrieval of affiliate database records in support of ACM-W regional computing celebrations
  - Established project collaboration environment utilizing Microsoft Office 365 services
  - Populated Computer Engineering curricular framework
  - Modified the representation of the relationships among program outcomes, courses and course learning outcomes to facilitate use by educators
  - Modified the integration of social media (Facebook, Twitter) with CAP Space

- Continuation on CS2013 steering committee curricular development project
  - Received service award from SIGCAS for work on Social & Professional KA

- Continuation of CCECC representation on and collaboration with the ACM Education Policy Committee
  - Provided valuable community college input into the Pathways report: 2+2+2 articulation model from the state of Kentucky

- Continuation of CCECC representation on and collaboration with the ACM-W council.

  - Attended CSTA annual conference; shared core IT learning outcomes for feedback

- Continued serving as a Security Ambassador under NSF award #1241738 through the Federal Cyber Service, Scholarship for Service (SFS) program - “Security Injections: Promoting Responsible Coding and Building a Community of Security Ambassadors.” ACM headquarters received funding as a subaward under this NSF grant (9/1/2012 – 8/31/2015)

- Participated in NSF Cybersecurity Curriculum workshop and provided feedback on both drafts of the workshop report (February 2013 in Atlanta, GA)

- Engaged in a variety of advocacy efforts on behalf of computing education in the community college sector including SIGITE 2012 (October), Grace Hopper conference 2012 (October), CSEdWeek 2012 (December), MPICT Winter Conference 2013 (January), SIGCSE 2013 (March), ITiCSE 2013 (June), and the first ever community college Women in Computing Celebration 2013 (March) – http://kycw-wic.com.

- Continued communication with colleagues via a featured quarterly column in the ACM Inroads publication, Community College Corner – columns available through CAP Space at www.capspace.org/committee/projects.aspx.

- Continuation of dissemination and outreach activities, including mailings, website enhancements, conference sessions and exchanges with colleagues

- Continued support for the ACM Education Council and Education Board goals and objectives

### 1.6 Updating the computing curricula guidelines

With five volumes of curricular guidelines now published as well as an Overview volume, it had been necessary to demonstrate ACM’s commitment to keeping these curricular models up to date. The
following sub-sections offer additional comments about how that work proceeded in each of the major areas.

1.6.1 General strategy

Within the Education Board there had been a dialogue on whether the current five-volume strategy employed within CC2001 remains appropriate. The concept of the five-volume series has now received acceptance within the community and has had a considerable impact. Accordingly, it was felt that the five-volume idea should be retained for the next few years at least.

1.6.2 Computer science – Towards CS2013

The CS2013 work is a joint activity involving ACM and the IEEE Computer Society, with ACM taking the lead in line with an agreed Memorandum of Understanding between ACM and the Computer Society. Work on this has proceeded apace under the leadership of Mehran Sahami (Stanford) and Steve Roach (UT, El Paso). Publication is due in the autumn of 2013; it is intended to bring this before the ACM Council meeting in October to be endorsed.

In their early work, the CS2013 Steering Committee sent out a questionnaire (December 2010) to some 1500 US department chairs/directors of undergraduate education and around 2000 international departmental chairs to gather views and to gain reactions to earlier curricula efforts, in particular CS2001 and the interim volume CS2008, but also to receive suggestions for new topics and knowledge areas. Some 201 responses were received.

To stimulate and encourage community involvement, presentations and discussions have been held at FIE-11 in October 2011, SPLASH in October 2012, UCFCS in November 2011, SIGCSE-12 in March 2012, LACS in June 2012, CRA Snowbird in July 2012 and other presentations were planned for COMTEL Peru in October 2012 and FIE-12 also in October 2012.

The outline of the planned report is as follows:

- Guiding principles
- Body of knowledge
  - Topically organized set of “Knowledge Areas”
  - Knowledge Areas provide list of topics and learning outcomes
- Curricular structure
  - Guidance on how Body of Knowledge translates into curriculum
  - Institutional challenges
- Professional considerations
  - Characteristics of CS graduates
  - Professional practice
- Course and curricular exemplars
  - Pointers to and discussion of example curricula/courses reflecting diverse ways of covering the Body of Knowledge

1.6.3 Two-year college IT activity

There had been a wish in the community to press ahead with a two-year college volume on IT. The CCECC formed a group to undertake the work. The plan for the Development of Associate Degree IT Curricular Guidelines is set out below:

The proposed IT curricular guidelines envisions IT education and skills in the context of curricular pathways within various career domains and identifying forward-looking curricula, assessment and pedagogy that serves the targeted audience. The proposed IT curricular guidelines would be influenced and formulated by a broad-based consortium of participants.

Phase I – Research for associate-degree IT guidelines
Deliverables: report of preliminary investigation to the Chair of the ACM Education Board. Participants include: CCECC members; representatives from NSF ATE centers, SIGITE, IEEE-CS, Canadian Information Processing Society (CIPS); business, industry and government.

This had been completed and Phase II had commenced.

Phase II – Development of associate-degree IT guidelines

Deliverables: two iterative drafts (Strawman and Stoneman) with community review to produce the final curricular guidelines

During the previous FY CCECC had conducted phase 2 of the associate-degree Information Technology (IT) project in accordance with phase 1 findings and phase 2 funding. This involved:

- Assembling team of subject matter experts based around core pillars
- Assembling team of assessment experts
- Conducting in-person meeting (January 2013) in NYC
- Conducting monthly follow-up conference calls
- Providing a draft of core IT learning outcomes for community review and feedback
- Presenting results of NY meeting and core IT learning outcomes to Ed Council at March meeting (SIGCSE 2013)
- Conducting follow-up meetings on the East Coast (NY) and West Coast (CA) with select subject matter experts to process community feedback
- Produced second draft of core IT learning outcomes for community review and feedback
- Appointment of additional CCECC associate members in support of the associate-degree IT project.

1.6.4 Computer Engineering and Software Engineering

The question had arisen about updating curricula guidance published in 2004, for both Computer Engineering (CE) and Software Engineering (SE). Two small teams, joint with the IEEE Computer Society, were set up to consider the usefulness and desirability of undertaking such an exercise. Both groups concluded that a modest update of the curricula was desirable. Such an update should take account of the CS2013 developments to ensure currency.

The CE Review team would continue their work but with an augmented group; they have concluded that, given the changes in Computer Engineering, their review is likely to be more substantial than originally envisaged. The core team is:

Computer Society: Eric Durant (Milwaukee School of Engineering, lead), Mitch Thornton (SMU) and Time Wilson (ERAU)
ACM: John Impagliazzo (Hofstra University), Susan Conry (Clarkson University) and Andrew McGettrick (University of Strathclyde)

The team undertaking the SE work would consist of the following:

Computer Society: Mark Ardis, (Stevens Institute of Technology, lead),
Greg Hislop (Drexel University), Mark Sebern (Milwaukee School of Engineering)
ACM: Dave Badgen (University of Durham, UK)  
Jeff Offutt (George Mason University)  
Willem Visser (representing SIGSOFT)

It is anticipated that a preliminary version of the SE update will be released for review in the coming weeks.

1.6.5 Master’s in Information Systems
The Education Board had received a request that the Master’s volume on Information Systems guidance be reviewed. A preliminary study had been requested, this to include an indication of expected resources and a preferred way to proceed. The preliminary report entitled “Joint ACM/AIS Task Force to Evaluate the Need for a Revision of MSIS 2006: Model Curriculum and Guidelines for Graduate Degree Programs in Information Systems Final Report And Recommendation” authored by Heikki Topi (ACM), Al Harris (AIS), Ramesh Venkataraman (AIS) and Rolf Wigand (ACM) has just been received. This will be considered by the Board.

1.7 International activity

1.7.1 European efforts

Computing education conference

At a meeting between ACM Europe and Informatics Europe (the latter being essentially a group formed from the heads of Computing departments throughout Europe) there was discussion about computing education in Europe and agreement that there was a need for a high-profile and highly prestigious computing education conference in Europe. This would serve to pull together the computing education community within Europe and provide a much-needed forum for exchanging views and experiences as well as tracking new developments.

This had now been raised with SIGCSE, who have responsibility for the conference. A Joint Advisory Committee between SIGCSE and Informatics Europe has been formed to take this forward.

Monitoring activity

Members of the Board/Council have also been involved in:

- Collaborating with ACM Europe and Informatics Europe in producing guidance on computing in schools in Europe.
- Keeping a close eye on accreditation developments within Europe via EQANIE, the European Quality Assurance Network in Informatics Education and the work of that is being based on the outputs from Euro-Inf.
- Monitoring activity associated with the Seoul Accord. Importantly, Joe Turner, member of the Education Council, acts as its chair and informs the Education Council of relevant developments. Joe is also ACM’s representative to IFIP (the International Federation for Information Processing).

1.7.2 Developments related to India

Following discussion, a proposal had been received from ACM India (via Mathai Joseph, now ACM India representative on the Education Council) seeking support from the Education Board for activity that would contribute toward the improvement of CS education in India. That would be a considerable undertaking, given the size and scale of the problems.

Over the last 12 months ACM India had set up its own Education Board. The question of how ACM India should proceed was being discussed at that level. At the appropriate time ACM’s Education Board would be asked to provide input. However, it appeared that developments involving CS2013 as well as Online Education were already seen as providing useful input.

1.8 Improving Understanding of the Computing Education Landscape

An important role for the Education Board is to improve understanding of the computing education landscape, not just in the U.S., but globally. This helps to inform the Board and suggest areas of need and even priority.

Within certain institutions in the U.S. there have been some very positive indicators of expanding
enrollments. In part, evidence comes from the CRA Taulbee Survey. The Survey is conducted annually to document trends in enrollment, etc and it covers computer science, computer engineering and information sciences in U.S. and in Canada. The most recent survey results were published on 8th March 2013 and can be found at http://www.cra.org/resources/taulbee. Some highlights include:

- The number of new undergraduate majors has risen by 29.2% for 2011-12
- Ph.D. production in computing programs rose to its highest level ever with 1929, an 8.2% increase over 2010-11.

The Taulbee Survey is based on activity in Ph.D.-granting institutions in the U.S. and Canada. Declining enrollments remain of concern, and it is highly desirable to gather reliable statistics for the whole community. The annual Taulbee Report is limited in reach; currently there is no similar source of information about the large number of other institutions. The ACM-NDC project aims to address this.

A new committee – now referred to as the ACM-NDC Committee – has been formed; NDC = non-doctoral-granting departments in computing. It consists of Stu Sweben, Jodi Tims, John White, Jane Prey, Maggie Johnson and Yan Timanovsky. Over the last 12 months, a survey has been carried out resulting in a much broader and more complete perspective on statistics for the community. The first report is about to appear in ACM Inroads, and will be published on the ACM website. An iteration of the report is planned for the 2013-2014 academic year.

It should be noted that Taulbee (which probably gets about 50% completed forms) had only around 17% responses initially but when institutions saw the impact of the early work they were more encouraged to complete and the situation improved. So for ACM-NDC there is an onus on getting (even preliminary) results published and the hope is that this will act as a catalyst for improved responses and even more meaningful results.

1.9 Promoting new curricular themes and strategies

The continuing anxieties about the state of enrollments and poor retention rates in some quarters suggest that there continue to be problems with the image and effectiveness of computing education. It is appropriate to continue to address this head-on and to continue to see it as important.

1.10 New priority areas

1.10.1 Cybersecurity education

At SIGCSE 2012 the Education Board was approached by the National Science Foundation (NSF) and asked to undertake an activity leading to improvements in cybersecurity education (at institutions of higher learning). A submission was made to NSF and funding of this was approved (10th September 2012).

To summarize, on 21st and 22nd February a team of experts was convened to provide the computing community with advice and guidance on how best to meet U.S. cybersecurity education demands. It was argued that such a group would carry authority and its considered views would have the respect of the community.

It had been observed that to meet just U.S. government needs, more than 40,000 cybersecurity graduates were needed; the observation had been made by USACM that it was important to place an emphasis about high-quality education, and not just training; of some 65 Ph.D. graduates in the U.S. in cybersecurity in 2012 only one had entered higher education to teach.

The final report is now complete and about to be submitted. It will be available on the ACM website.

1.10.2 ACM Conference on Learning at Scale

The wish to have a symposium on online education has been addressed. In short, the first annual ACM Conference entitled Learning at Scale is to take place in Atlanta on 4th and 5th March 2014, immediately before and co-located with SIGCSE 2014. There are three co-chairs: Armando Fox (UC
Berkeley), Michelene T.H. Chi (Arizona State University) and Marti Hearst (UC Berkeley); this group has responsibility for producing an imaginative technical program. The General Chair is Mehran Sahami of Stanford University. See http://learningatscale.acm.org for further details.

In making arrangements for the conference, there has been very positive cooperation with the SIGCSE committee and the ACM staff themselves have been enormously supportive. Proceedings are to be published by ACM.

1.11 Enhancing the effectiveness of the Education Board and Education Council

In response to requests from members of the Education Council about better communications mechanisms, steps were taken to provide updates on computing education matters; in particular the Board has now included a column, called “EduBits,” in each edition of Inroads.

1.12 Technology and Tools Task Force

The Technology and Tools Task Force, chaired by Education Board member Dan Garcia, with former Education Council members Sally Fincher and Don Bailes, have as their charter: “Promote great teaching by providing the best technology and tools resources for computing educators.” They developed a Web 2.0 website: Technology that Educators of Computing Hail (TECH). Dan leads a group of (mostly undergraduate) students at UC Berkeley who work on the site, with the help of 36 volunteer moderators (faculty, graduate students and undergraduates from institutions around the world). Two years ago, activity was centered on migrating the site from the Plone-based ACM server to the Drupal-based Ensemble server. The TECH home is http://www.computingportal.org/TECH/.

TECH continues to be one of the flagship collections in Ensemble, highlighted as one of the three front-page arches. This past year, all of the new tools that were shared at the SIGCSE Birds-of-a-Feather session were added, cleaned up with the removal of some redundant data, and a TECH submission form for user submission was designed. Useful educational technologies will continue to be added as they are brought to the attention of the group.

Ensemble is a project of Education Board member Lillian “Boots” Cassel and several other faculty, and is described on their About page at http://www.computingportal.org/about:

Ensemble is a new NSF NSDL Pathways project working to establish a national, distributed digital library for computing education. Our project is building a distributed portal providing access to a broad range of existing educational resources for computing while preserving the collections and their associated curation processes. We want to encourage contribution, use, reuse, review and evaluation of educational materials at multiple levels of granularity and we seek to support the full range of computing education communities including computer science, computer engineering, software engineering, information science, information systems and information technology as well as other areas often called “computing + X” or “X informatics.”

The Ensemble site provides a wealth of web 2.0 features, such as commenting, rating, and tagging of resources. It also supports roles, which serve as a reward structure for encouraging participation. Finally, Ensemble has a growing user community, which will be key to the success of TECH. The Beta launch of TECH in Ensemble took place at SIGCSE 2011, and Ensemble itself went off Beta at SIGCSE 2012 after a revamp of its interface. The upcoming year will focus on refreshing the tools to add those that have been recently authored, and integrating the Piazza tool to facilitate group discussion around TECH tools.
Section Two

Priorities for FY 2014

2.1 Comment on the priorities of the Board

During the previous FY much progress was made on a number of fronts. One aspect of this has been that separate committees have been set up to take forward the earlier work of TauRUs (now ACM-NDC) and the CS 10k challenge. The Education Board/Council will wish to maintain a lively interest in these developments and will wish to receive reports on progress, but the main focus of activity has moved elsewhere. This pattern may well become a feature of Board activities. It is viewed very positively.

2.2 Forthcoming Education Council activities

In the coming FY, there is the opportunity for two meetings of the Education Council. The first will take place in November 2013 in San Francisco. There is a need to build on the success of previous Council meetings, maintain the momentum and address identified action items.

2.3 Supporting K-12 efforts

Building on the success of the brochure

The production of the brochure and the linked web site had been a high profile activity of the Education Board/Council that had a wholly beneficial impact. Every piece of feedback has been entirely positive and there is still interest in that. Although there are indications from the top institutions that there is a recent alleviation of the enrolment problems, it is far too early to make sweeping claims; the work of ACM-NDC should shed light on the situation. There are regular suggestions of updating the brochure and the associated web site. These are being dealt with as they arise.

AP and CS10k initiatives

Various members of the Education Council are involved in the ongoing developments of the new AP examination under the leadership of Jan Cuny. To be more specific, Owen Astrachan is one of the Co-PI’s of the Commission working on the new AP CS Principles course and both Chris Stephenson and Mark Guzdial are members of the Commission. Jan Cuny, Dan Garcia, Deepak Kumar and Eric Roberts are members of the associated Advisory Group. The focus of the associated CS10k project has moved elsewhere.

2.4 Plans of the CCECC

The CCECC plans to pursue the following activities in FY14 (July 1, 2013 – June 30, 2014):

- Conclude phase 2 of the associate-degree Information Technology (IT) project in accordance with phase 1 findings and phase 2 funding:
  - Produce second (Ironman) version of IT guidelines for community review and comment
  - Produce final associate-degree curricular guidelines for IT
  - Disseminate guidelines via CAP Space, conferences and perhaps the ACM DL
- Begin associate-degree Computer Science curricular guidelines
  - Based on CS2013 guidelines: http://www.cs2013.org
- On-going development and maintenance of CAP Space committee site and resources to the computing education community
- Appointment of additional CCECC members (associate and full) depending upon expertise needed
- Conclude serving on CS2013 steering committee when CS curricular guidelines are completed and approved by the ACM Ed Board
• Continue collaborating with and serving on ACM-W Council; continue representation on and collaboration with the ACM Education Policy Committee
• Continue serving as a Security Ambassador under NSF award #1241738 through the Federal Cyber Service, Scholarship for Service (SFS) program – “Security Injections: Promoting Responsible Coding and Building a Community of Security Ambassadors.” ACM headquarters received funding as a sub-award under this NSF grant (9/1/2012 – 8/31/2015).
• Continue a variety of advocacy efforts on behalf of computing education in the community college sector, such as various conferences, meetings and workshops
• Continue communication with colleagues via a featured quarterly column in the ACM Inroads publication, Community College Corner – columns available through CAP Space at http://www.capspace.org/committee/projects.aspx
• Continue collaboration with CSTA, http://www.csta.org, (Chris Stephenson, Executive Director
• Continuation of dissemination and outreach activities, including mailings, website enhancements, conference sessions and exchanges with colleagues
• Continue support for the ACM Education Council and Education Board goals and objectives

2.5 Undergraduate curriculum efforts

Toward Computer Science 2013 (CS2013)

The CS2013 effort is entering its final phase with production imminent. The work on identifying ever-better exemplars of good practice and making these available to the community is likely to mean an ongoing activity for some time. Planning for this will be addressed.

It should be noted that a Chinese version of this report (slightly modified to take account of Chinese wishes) is to be published in Chinese in conjunction with ACM China and CCF.

Two-Year College IT plans

The Education Board will continue to be involved in monitoring progress and in supporting this work.

Software Engineering and Computer Engineering

Work on producing interim updates of both the Software Engineering volume and the Computer Engineering volumes will proceed. They have been asked to take into account the findings of the CS2013 group. The various committees have been established and their work is in progress. ACM China has expressed interest in becoming involved with both of these and discussions are taking place.

Information Technology

SIGITE has come forward to the Board with a request to initiate a review of their Information Technology guidance, published originally in 2008. The opportunity has been taken to pull these processes into line with the other processes of the Board. A preliminary study is being requested prior to the main study so that the parameters are clear to everyone.

This request has given prominence to a matter that has been in the Board’s thinking for some time: should there continue to be separate Information Systems and Information Technology reports or should these be merged? This is being addressed.

2.6 Master’s guidance on Information Systems

The Board has received a report of a preliminary study to initiate a review of Master’s-level guidance on Information Systems. This will be acted upon. The last report appeared in 2006 and a review seems appropriate.

2.7 Extending the leadership role
The Education Board needs to continue to be alert to enhancing its leadership role. Beyond the activities already identified, the Education Board will need to consider the possibility of additional curricular developments. The nature and scope of the CS2013 report will be crucial in this regard, and any conclusions emerging from that work.

2.8 International activities

During the next FY existing international activities will be maintained but in addition some new initiatives will take place. In terms of ongoing activity:

- The Education Board will need to continue to work to support ACM India in making progress with their educational initiatives
- It is expected that there will be a resolution of the discussions concerning the intended re-launch of the Informatics Education Europe series of conferences. It is worth noting that there have been expressions of real interest from several quarters and it is clear that there is a computing education community in Europe whose needs have to be addressed. Any new series of computing education conferences has to be put on a sound footing.
- In Europe there is now a permanent accreditation activity based on the results of the Euro-Inf project, namely EQANIE. Members of the Board / Council continue to monitor developments.
- Developments associated with the Seoul Accord (with Joe Turner of the Education Council as chair) continue to be monitored.

With these various developments it seems appropriate for the Education Board to take a more strategic view of how it should support computing education globally. Now representatives from both the ACM India Council and the ACM China Councils have been included in the membership of the Education Council, and there is representation from South America (Brazil). It is pleasing to see ACM China’s interest in the curricular guidance volumes. The notion of the Education Board/Council partnering with and supporting the various ACM councils seems highly relevant.

2.9 PACE – moving forward

PACE has to be seen as serving a useful purpose beyond being just a venue for the various actors to learn to know about each other’s work. It should lead to immediate coordinated action and begin to have an impact. The NSF project referred to earlier could act as a real incentive for meaningful activity.

2.10 Promoting new curricular themes and strategies

Addressing the matter of new curricular themes and strategies is central to many of the Education Board/Council activities. Some of the new activity within the Council has this as a central focus and concern. The conclusions of the CS2013 project will provide an opportunity for reflection here.

2.10.1 ACM Conference on Learning at Scale

This conference is likely to be a hugely important event in the coming year. The Education Board will need to ensure that all aspects of this are monitored. Early thinking had suggested that:

- There is much happening in the area and it is desirable to establish ACM’s position as a supporter of these efforts
- An outcome of the conference should be a clearer picture of how online learning might be embedded in the ongoing activities of ACM
- The conference has been advertised as an annual event and mechanisms for embedding this in the ACM calendar need to be established
- Online learning has the potential to underpin many of ACM’s activities in support of its members and it would be important for ACM to establish a position on this

2.10.2 Cybersecurity education

As already reported, the Education Board had received a grant from NSF – the study is entitled
Toward Curricular Guidelines for Cyberecurity. This involved holding a meeting of experts in the area and producing a report, the latter to be published on the ACM web site. Follow-up activity will be considered.

2.11 Continuing to foster a positive image of computing

The Education Board/Council continue to believe that fostering a positive image of the discipline must remain a central concern. The vision must be appealing and stimulating to the community, it needs to offer advantages over existing possibilities, and it must lead to a measurable benefits in terms of enrollment trends. The Education Board/Council must continue to take the lead in this activity, but it will be important to engage the broader community in this discussion and debate.

Having said this, there is evidence that, for some institutions, the numbers seeking to pursue computing degrees is swamping faculty and departments. This matter is to form part of the discussion at the next Education Council meeting in San Francisco.

It remains important to identify new curricular models and approaches that have proven to be effective in the institutions at which they were developed and then helping to promote the distribution of those new models by developing new curricular recommendations around those themes.

2.12 Increasing visibility within the community

Another strategic goal toward increasing the effectiveness of the Education Board/Council consists of promoting public awareness of our work. Increasing our visibility is important:

- The community needs to be informed about the changes that have occurred and the reasons underlying those changes. It is encouraging that members of the Practitioners Board recently sought an update on Education Board/Council activities at a meeting in mid June 2011 in San Francisco. The Learning at Scale conference, for instance, is likely to be of considerable significance to ACM well beyond the Education Board.
- At a time in which so many people in computing education continue to feel threatened by the possibility of declining enrollments or now even excessive enrollments, it is important for the ACM to be seen as an organization that not only cares about the problems but also as one that can marshal the resources necessary to have an impact.
- The Education Board/Council need to continue to ensure that they have firmly established their leadership position and a fundamental aspect of this is being visible and being seen to be active in addressing the problems of the day and providing the necessary support.

Acknowledgments

This report has relied heavily on the work of many people – those engaged in CS 2013, the CCECC group, Yan Timanovsky and members of the Education Board and Education Council.
Annex A

Roster of the Education Board and Education Council members (FY 2011)

Education Board
Andrew McGettrick, Strathclyde University, UK (Chair)
Lillian Cassel, Villanova University
Dan Garcia, University of California at Berkeley
Dan Grossman, University of Washington; SIGPLAN Rep (on Ed Council)
John Impagliazzo, Hofstra University
Mirella Moro, Universidade Federal de Minas Gerais – UFMG, Belo Horizonte - MG, Brazil
Jane Prey, NSF and formerly of Microsoft
Deborah Richardson, University of California at Irvine
Eric Roberts, Stanford University (past chair)
Mehran Sahami, Stanford University
Heikki Topi, Bentley University

Yan Timanovsky, ACM Education Manager

John R. White, ACM Chief Executive Officer
Chris Stephenson, Executive Director, Computer Science Teachers Association
Cameron Wilson, Computing Education Policy Committee (and ACM)

Education Council (which also includes the members of the Education Board)

Flo Appel, Xavier University (SIGCAS)
Owen Astrachan, Duke University
Colleen Case, Schoolcraft College (SIGGRAPH)
Alison Clear / Young, Auckland University of Technology, New Zealand
Steve Cooper (CSTA)
Jan Cuny, University of Oregon/NSF
Peter Denning, Naval Postgraduate School
Don Gotterbarn, East Tennessee State University (ICCP)
Mark Guzdial, Georgia Tech
Beth Hawthorne, Union County College (CCECC)
Mathai Joseph, representing ACM India
Lisa Kaczmarczyk, University of California at San Diego
Deepak Kumar, Bryn Mawr College
Rich LeBlanc, University of Seattle
Barry Lunt, Brigham Young University (SIGITE)
Robert McCartney, University of Connecticut (ToCE)
Barbara Boucher Owens, Southwestern University (SIGCSE)
Peter Norvig, Google
Larry Snyder, University of Washington
Eugene Spafford, Purdue University
Mark Stehlik, Carnegie Mellon University
Josh Tenenberg, University of Washington (ToCE)
Joe Turner, Clemson University (retired)
Gerrit van der Veer, Vrije Universiteit Amsterdam, the Netherlands (SIGCHI)
Michael Wrinn, Intel
Gayle Yaverbaum, representing ABET/CSAB
Ming Zhang, representing CCF and ACM China