

**ACM Education Board
Annual Report for FY08**

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Executive Summary

This report summarizes the activities of the ACM Education Board and the Education Council in FY08 and outlines priorities for the coming year. Major accomplishments for this past year include the following:

- Working to reversing declining enrollments in computing disciplines
- Fostering a positive image of computing among young people
- Updating the computer science, information technology and information science curriculum guidelines
- Initiating a Masters level activity on curricular guidance
- Promoting new curricular themes and strategies
- Initiating discussions with NSF and seeking support for a Summit in Computing Education
- Broadening international participation in computing education activities
- Enhancing the effectiveness of the reorganized Education Board / Council
- Increasing our visibility within the community

Challenges for FY09 include further development of many of last year's activities:

- Further evolution of the Education Board and Education Council arrangements
- Hosting a summit on the crisis in Computing Education
- Further advancing the curricular guidance in Computer Science, Information Systems and Information Technology and producing publications in all three areas
- Exploring with the Education Council whether the 5-volumes (of CS, SE, CE, IS and IT) remain fit for purpose in the future
- Providing guidance to the community on Masters provision in the form of a publication
- Increasing web based support for the community to keep them more involved with curriculum development
- Increasing international activity
- Initiating publication outlets for the computing education community
- Further extending the leadership role of the Education Board / Council

Section one

Summary of FY 08 Activity

1.1 Education Council activities

Two meetings of the Education Council were held during FY 08. The first (the third meeting of the Council) took place in Seattle on 29th and 30th September 2007; the second meeting (fourth meeting of the Council) took place of 24th and 25th April 2008 in Boston. As was clear from the earlier meetings, the energy level of the Education Council is always extraordinarily high. The participants share a sense of urgency about the state of computing education and a strong commitment to improving the situation, and this includes attracting more students to the field and taking steps to heighten the profile of the area. The members of the Education Council are always actively engaged during the meetings, although we have had trouble maintaining that energy in the intervening times. We are convinced that harnessing that energy will require face-to-face meetings more regularly than the once-a-year schedule originally proposed. At the EC budget meeting in February 2007, we proposed increasing the frequency to two meetings a year and compromised on an eight-month schedule that will alternate between one and two meetings in each fiscal year.

A feature of both meetings was the inclusion in the program of an industrial panel. Leading industrialists / employers made presentations on their expectations of graduates and expectations of the education sector. There was then an opportunity for Education Council members to engage in a question / answer session. These were lively sessions with a stimulating and thought provoking interchange of views. In Seattle Terry Linkletter organized a panel consisting of James Whittaker from Microsoft (who chaired the session), Keith Purser from Boeing, Demian Godon from Adobe and Steve Yegge from Google. They projected a particular view of the industry. To create a more balanced perspective about the needs and views of the industry overall, the Boston meeting had Luke Chilone (Executive Director from Morgan-Stanley's Wealth Management Group), Philip DesAutels (Academic Evangelism Manager from Microsoft), Mehul Kapadia (Manager from Deloitte Consulting IT Strategy & Management Practice) and Heikki Topi from Bentley College had both organized the event and then acted as Moderator.

At the September meeting, there was a particular focus on the National Science Foundation initiatives and in particular the CPATH initiative. Joe Urban from NSF gave an overview of activity and there were presentations from Peter Denning and Owen Astrachan who had been awarded Distinguished Educator status under the CPATH initiatives; these were the only two such awards and both are on the Education Council.

At the April meeting, attention was devoted to such matters as the international perspective of Education Council activity, the aims and objectives of the Council and to the important matter of stimulating activity within the Council with a view to having an impact within the community. The concept of a new journal, with a title such as *Transactions in Computing Education*, received support and is being progressed. But in addition a set of important activities were identified beyond the work of the task forces already in existence (namely enrollment crisis and public image, technology and tools, curriculum and accreditation, the latter one on accreditation being in abeyance). These new activities included looking at the first year experience, embarking on data gathering to inform decisions of the Education Council, looking at the question of sustainability, looking at the possibility of curriculum guidance for joint or interdisciplinary degrees, and embarking on the publication of a handbook to infuse the community with novel ideas on selected topics.

1.2 Supporting K-12 computing efforts

Reversing declining enrollments in computing disciplines

Declining enrollments continued to be an extremely worrying feature of the computing education scene. This matter remains of deep concern, not only to those in education, but to employers and to industrialists. Given the strong link between information technology and innovation, this matter is vital to the continued leadership role of this country and beyond.

Members of the Education Board / Council had produced:

- A brochure which went out to approximately 62,000 high schools and middle schools in the United States. The hope is that broad distribution would encourage students— particularly women and students from disadvantaged communities—to consider studying computing, even if they might otherwise have given little or no thought to that possibility. Around 500,000 copies of this have been produced and distributed via meetings and as a result of requests from institutions; the brochure has also been used (with some element of customization) in Canada, and in Scotland and there is now a Spanish version which can be downloaded from the careers web site.
- A web site for further guidance and information. The brochure contains the address of a web site at www.computingcareers.acm.org that includes additional material on educational and career options in the computing field. The web site also links back to the brochure and makes it easy for interested parties to obtain additional copies.

This activity was undertaken with the help, support, approval, and guidance of Chris Stephenson in CSTA and her colleagues. It is important that this close partnership should continue. Indeed it has. Copies of the brochure continue to be distributed both within the US and in other countries (where in many cases permission has been given to customize it to local needs).

In some places both in the US and in other countries there is evidence that there is a change and resurgence in numbers of enrolments. While perhaps it would be extreme to attribute all successes to the brochure and the web site, certainly these have been seen to have contributed very positively to the turn around. It remains important that this effort should continue and that the benefit is sustained.

Fostering a positive image of computing among young people

One of the factors contributing to the enrollment crisis has been that young people do not see today's programs of study in computing as being sufficiently attractive or offering attractive career opportunities. The reasons given for this loss of interest in the popular press include the phenomena of offshoring and outsourcing, a poor understanding of the discipline among the general public, problems with the teaching of the discipline in high school, inadequate attention to the achievements of the discipline, and a lack of diversity in the field that reduces its appeal to women and minorities. These factors are complex and interconnected. The Education Board and Education Council have continued to analyze the situation to try to gain a better understanding of the dynamics and relative importance of these issues.

Grady Booch gave 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. Several members of the Education Board spoke with Grady at that SIGCSE, and subsequently a conference call was organized so that more of the Board members could be involved. (We believe that Grady will continue his involvement and, in particular, will help us to connect with other people in industry who have similar interests in education.)

At SIGCSE 08 in Portland, members of the Education Board put forward a submission for a special panel session that would build on this. Their submission was successful and their session on *Rediscovering the Passion, Beauty, Joy and Awe: Making Computing Fun Again* attracted a considerable audience and was later deemed to be one of the successes of the conference. Indeed there have been suggestions that this should become a regular feature of future SIGCSE conferences.

Curriculum considerations

It has seemed clear that any action plan we develop would need to include a campaign of some kind to foster more positive images of the discipline among young people. That campaign would probably involve developing new curricular offerings that hold greater appeal and greater promise. We expect that it will be important over the next several years to experiment with different models intended to increase the attractiveness of the discipline. It is unlikely that any single model or any single remedy will meet the needs of all students. Individual members of the Education Board / Council have developed ideas in this regard and 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.

1.3 Two-year college activities

Dr. Elizabeth K. Hawthorne is chair of the Two-Year College Education Committee (TYCEC) which consists of Elizabeth K. Hawthorne (Union County College), Robert D. Campbell (CUNY), Karl J. Klee (Alfred State College) and Anita Wright (Camden County College).

The Two-Year College (TYC) Education Committee is a standing committee (since October, 1991) of the ACM Education Board. The Committee is concerned with all education issues that affect computing at two-year colleges and in two-year degree programs. The primary purpose of the Committee is to provide curriculum recommendations in all areas of computing for such degree programs. The Committee may also make recommendations on other educational matters affecting such programs.

The TYCEC achieved the following milestones in FY08:

- reconstituted the leadership and membership of the TYCEC by adding Anita Wright as a member and appointing Elizabeth Hawthorne as chair.
- executed research and collaboration activities in preparation for updating the associate-degree Information Technology curriculum guidelines by providing feedback on the baccalaureate IT report and by visiting and learning from the following NSF ATE centers: National Workforce Center for Emerging Technologies (NWCET) at Bellevue Community College in Washington; Boston Area Advanced Technological Education Connections (BATEC) at the University of Massachusetts in Boston, and the National Center for Telecommunications Technology (NCTT) at Springfield Technical Community College in Massachusetts.
- cooperated with the committee that worked on the five-year interim report to update the Computer Science curriculum, and as a result are in the process of updating the associated two-year college education curriculum guidelines in Computer Science.
- participated in the Computer Science Education NSDL workshop during April 2008.
- submitted a grant proposal to the National Science Foundation to conduct a Strategic Summit on the Computing Education Challenges for Community Colleges.
- continued its dissemination and outreach activities, including mailings, website enhancements, conference sessions and exchanges with colleagues, as well as participation with the ACM Education Council. The members of the TYCEC conducted both a birds-of-a-feather and poster sessions at SIGCSE 2008.
- supported the goals and objectives of the ACM Education Council.
- continued to inform constituents of its activities via the regular column in the SIGCSE Inroads publication.
- established a wiki for use by the committee and the two-year college community – <http://wiki.acmtyc.org>.
- furthered the internationalization of its work, including a poster session presented at the June 2008 ITiCSE conference in Madrid, Spain.

1.4 Updating the computing curricula guidelines

With five volumes of curricular guidelines now published (or are about to be) as well as an Overview volume, we had to put in place a process that demonstrated 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.

1.4.1 Computer science

The CS volume in the Computing Curricula 2001 series was published in December 2001 and has therefore been in place for nearly seven years. The joint ACM/IEEE-CS Executive Committee initiated a review of the Computer Science volume in the spring of 2006, led by Larry Snyder. That group has offered a preliminary report on strategic options that the Education Board discussed, and subsequently an interim review of the CS volume was commissioned. This review is being carried out jointly by ACM

and the IEEE Computer Society. Interim reviews are a new concept, and this is the first such effort. It was always intended to be less resource intensive than a full review but a key requirement was to keep the curricular guidance up-to-date and in the process address matters of major concern to the community. Thus, for instance, the expectation was that the structure of the original volume would be retained. But this effort was to be seen as something of an experiment and the findings would feed through to other such efforts.

In the event, the Interim Review Task Force consisted of: from ACM, Andrew McGettrick (co-chair, University of Strathclyde, UK), Boots Cassel (Villanova University), Gordon Davies (formerly Open University in UK, consultant), Mark Guzdial (Georgia Tech), Larry Snyder (University of Washington); from the Computer Society, Renee McCauley (co-chair, College of Charleston), Alan Clements (University of Teesside, UK), Bob Sloan (University of Illinois at Chicago), Paul Tymann (Rochester Institute of Technology) and Bruce Weide (Ohio State University). A Special Advisory Group was also set up to provide guidance on all matters; importantly that included the co-chairs of the previous report plus industrial representation involving those with an interest in these curricular developments as well as Two-Year College representation. It consisted of Eric Roberts (Stanford), James Cross (Auburn University), Anita Wright (Camden County College, NJ), Maggie Johnson (Google) and James Whittaker (Microsoft).

The current status of the review is that the final changes are being made. This follows an initial public consultation (which involved use of a web site to gather comments, a public meeting at Estes Park in Colorado, and very useful input from a number of individuals) a set of comments have been received. The web site activity itself drew a total of 163 comments from some 68 individuals, these covering academics, industrialists and professionals. These and other comments formed the basis of the review activity, though there were additional opportunities for consultation, e.g. at SIGCSE 2008 in Portland. Following the completion of this task, the Special Advisory Group was asked for their comments on the interim report and observations and a further opportunity for public consultation of the final document took place, closing date being at the start of July. Somewhat curiously (and partly because of a SIGPLAN conference on the teaching of computing in Harvard in the last days of May) this provoked in excess of 200 responses the vast majority being about the teaching of programming. Many of these issues proved to be extremely sensitive and they had to be handled with considerable care. Work on this has just been completed.

Part of this activity has also been the development of a methodology for having a web-based mechanism to engage the community in ongoing involvement with this kind of curricular guidance. Delicate balances have to be drawn here, part of the challenge being to avoid creating confusion within the community and to provide something that is genuinely useful.

1.4.2 Information systems

The existing version of the Information Systems report dates back to 2002. A thorough review and revision of this work has been needed, particularly in light of the fact that the 2002 report consists largely of updates to the previous IS report. A comprehensive in-depth review is under way and making steady progress. The work is a joint effort between ACM and the Association for Information Systems (AIS). By way of background, the AIS is a primarily academic organization the mission of which is to advance knowledge in the use of information technology to improve organizational performance and individual quality of work.

The ACM/AIS Undergraduate Revision Task Force consists of Heikki Topi and Joe Valacich as co-chairs. More completely, the ACM representatives are Heikki Topi from Bentley College, Jay Nunamaker from the University of Arizona, and Janice Sipior from Villanova University; representing AIS are Joe Valacich, College of Business and Economics at Washington State University, Kate Kaiser from Marquette University, and GJ de Vreede from the University of Nebraska at Omaha.

The major review of the Information Systems volume has continued through FY 08. In August 2007 the first public introduction of the work to the IS community occurred at the Americas Conference on Information Systems AMCIS 2007 at Colorado State University; around this time there was the launch of the associated wiki at blogsandwikis.bentley.edu/iscurriculum to encourage the community to participate in the ongoing review process. In November 2007 a journal article on the project was published in the Communications of the AIS; in December 2007 there was a presentation and status

report at the AIS SIG-ED (IAIM) meeting in Montreal. Following these consultation exercises in February 2008 at a task force meeting in Seattle, there was a major reorientation of the project based on community feedback; in particular there was a strong focus on learning outcomes (which have changed significantly). In June 2008, there was a panel presentation at the European Conference on Information Systems 2008 in Galway, Ireland focusing on global participation issues.

1.4.3 Information technology

This report will be the final component of the Computing Curricula 2001 effort. A presentation on the IT volume took place during the Education Council meeting back in December 06. Members of the Education Council have been offering advice and support to bring this work to a speedy and effective conclusion. Yet during the year a number of problems arose and the Education Board had to take decisive action to assist with this activity. At this stage the opportunity was taken to ensure Computer Society involvement, a step that would facilitate the eventual approval of the document by both ACM and the IEEE Computer Society.

In order to address the lack of progress toward completion of the IT curriculum volume, a new Steering Committee was created late in 2007. This group included two members of the IT Volume Writing Committee (Barry Lunt and J. J. Ekstrom) along with representatives appointed by the ACM Education Board (Richard LeBlanc) and the IEEE Computer Society Educational Activities Board (Greg Hislop). The Steering Committee oversaw revisions to the draft volume to respond to comments received from previous community reviews and concerns about the previous draft expressed by the Education Board. The revision also incorporated some needed updates to the body of knowledge and other sections of the volume. A working meeting of the Steering Committee, several additional writing committee members and representatives of the two-year curriculum committee was held in late February. A new draft was published late in the Spring, with reviews solicited on the ACM website. The review period continued until the end of July

1.5 Masters degree initiative

Part of the motivation behind this initiative is the attention being given to Masters programs in many countries. In Europe, for instance, the Bologna agreement has spawned considerable interest in and attention to Masters programs. But worldwide there is ever greater attention to the effectiveness of degree programs and to mutual recognition of qualifications across the globe. Given the ACM leadership position in computing education, it was deemed important that ACM should seek to provide guidance in this area.

This Masters initiative is a joint activity involving members of the Education Board and Education Council working with members of the IEEE Computer Society. The team involved is: Lillian Cassel (chair), Michael Caspersen, Gordon Davies, Art Peyster, Kevin Scott, and Heikki Topi.

The findings of the group to date include the following:

- Masters Programs exist in large numbers, and they vary greatly; recently the CRA Bulletin highlighted the fact that in 2005 graduates from Masters degrees in Computing had risen by some 11%
- There should be a wider dissemination of knowledge about these programs
- There was a need for the group to gain a broader understanding of the reasons for these different programs.

It would be worthwhile to document what schools are actually doing by conducting a global survey. For example, at Stanford University specialization is required in one of nine specializations whereas at Berkeley Masters programs were viewed as a fifth-year program. There was a need to determine the following:

- the mix of full time and part time students, and the percentage of returning mature students
- the balance of professional and research-oriented Masters programs
- the typical character of specialized degrees (e.g. gaming, forensics) and where these programs are located

- the nature of fifth year Masters programs.

The students in these programs have a variety of goals: to specialize in a particular field, to broaden their skill set, or to change careers. It seemed desirable to develop a scheme for categorizing these programs recognizing that they cover topics such as Information Systems and Software Engineering.

“Best practices” had to be established with regard to Masters programs outside the U.S. where there tends to be more of a mixture of different kinds of students – these programs often have more of a professional rather than research orientation. Many Business Schools are partners in many of these Masters programs. The trends influencing these programs were of interest.

The final report should not seek to micro-manage Masters programs; they are often seen primarily as a financial resource by institutions and generally are very diverse in character.

1.6 Leadership role

It has been important that the Education Board takes on new challenges and in particular seeks to extend its leadership role.

1.6.1 Computing education summit

Over the last 12 months there was the intention to initiate a Summit to consider the crisis in enrolments in Computing departments and schools. This would involve a meeting between the Education Board and parties such as the National Science Foundation (NSF). Indeed a meeting took place in December 2007 between the members of the Education Board and representatives of NSF (Harriet Taylor and Joe Urban) and for this both Cameron Wilson and Bobby Schnabel were invited; their presence was much appreciated.

The intention here is twofold: firstly to share our ideas and understanding of the crisis – its origins, its manifestations, etc; and secondly, to see how we can better work together to find a way ahead in which the various parties cooperate. In anticipation of this the members of the Education Board drew up an initial document to outline aims and objectives of such a meeting to ensure that the members of the Board would be well prepared and the meeting would have positive and beneficial outcomes.

Following this a formal submission was made to NSF and funds have now been secured for a Summit to take place probably in Washington and probably in the Spring of 2009. The ACM Education Board is taking the lead in the planning and organization of this event.

1.6.2 Computing education publications

At the Education Council meeting in Boston consideration was given to the possibility of creating a *Transactions in Computing Education*. The intention was that this should become a flagship publication for the Computing Education community. The idea was initially met with some concern and skepticism but a fruitful dialogue ensued both at the Education Council meeting itself and in follow-up activity. The consequence of this is that a proposal will be placed before the Pubs Board whereby Jeric will be transformed into a *Transactions in Computing Education* (or some such title).

1.7 International activity

There have been a number of aspects to the international activities of the Education Board. Members of the Board / Council have been involved in

- monitoring the activities of Informatics Europe through participation in the organizing committee and in attendance at the annual European Computer Science Summit which was held in October 2007 in Berlin in Germany. Originally it had been envisioned that this would result in the creation of a CRA-Europe, though interest in education has been quite apparent. Indeed the first report (and the only one to date) of Informatics Europe has addressed the image of the

discipline and members of the Education Board have been heavily involved in this. The latter has reflected a recognition of concerns related to enrollment, public perception, and so on.

- planning and in leading the Informatics Education Europe conference which was held in Thessaloniki in Greece in November 2007
- keeping a close eye on accreditation developments within Europe. There has been an EU funded project called Euro-Inf project managed by ASIIN in Germany with main partners the University of Paderborn and the University of Applied Sciences in Hamburg in Germany and involving CEPIS in Brussels. The main purpose of this project has been to devise criteria for the accreditation of degrees in Informatics across Europe, both at the undergraduate level and at Masters level. Education Board / Council members are involved in this in an international advisory capacity and are present at the major meetings.
- monitoring activity leading to the signing of the Seoul Accord. A number of countries (South Korea, US, UK, Canada, Australia and Japan) are seeking to develop criteria for the mutual recognition internationally of accreditation activity. This is intended to mirror for informatics the Washington Accord which is highly regarded by the engineering community. The groups involved are: the Accreditation Board for Engineering Education of Korea, ABET, the BCS, the Canadian Information Processing Society, the Australian Computer Society and the Japan Accreditation Board for Engineers.
- beyond this, members of the Board have been involved (as members of the conference committee) in planning an Education Summit in China. This is due to be held in Beijing on 24th and 25th October 2008.

1.8 Promoting new curricular themes and strategies

The continuing decline in enrollments and poor retention rates suggest that there continue to be problems with the image and effectiveness of computing education, which seems to have limited appeal to current students and its ongoing popularity. This is true at all levels in the world of education. It is appropriate to continue to address this head-on and to continue to see it as important.

One of the major challenges is to understand in detail the nature of computing education at all levels and to decide how we can re-conceptualize computing education in a way that will make it more appealing. Can we create at least one image of computing education that is new and different and does not suffer from the ills of the present situation?

Some of the new activity within the Education Council is expected to contribute here. In particular there is a group addressing first year courses and the Handbook is a concept that is expected to become a vehicle for addressing new ideas.

1.9 Enhancing the effectiveness of the Education Board and Education Council

The range of activities in which the Education Board / Council are engaged is considerable and growing. To meet the many challenges, it is essential to maximize the efficiency of our internal processes and structures. The primary role of the Education Board is to manage and guide the work of the Education Council, and to develop mechanisms that allow it to function as effectively as possible. Originally four task forces had been set up within the Education Council, and these were given specific charges to empower them to carry out the relevant tasks. They were: enrollment crisis and public image, technology and tools, curriculum and finally accreditation.

The new developments at the most recent Education Council meeting increased the level of activity substantially but that now needs to be monitored, encouraged and sustained. That will be a challenge in the coming months.

Each of these groups has been asked to assess the challenges in their areas of concern, to identify both short-term and long-term goals, and to develop concrete strategies for achieving those goals. Such is the

rate of change in the general area of computing that there will need to be regular review of the structures and responsibilities and to consolidate.

Section two

Priorities for FY09

2.1 Forthcoming Education Council activities

Next Education Council meeting

Given the agreement with the ACM Executive about finances, just a single Education Council meeting is planned for FY 09. This is in keeping with the idea of scheduling these meetings approximately once every eight months. The meeting is planned to take place in San Diego in December 08.

At that meeting it will be important to build on the successes of previous meetings. But in addition the Council will be asked to give consideration to such matters as

- Aspects of the next full revision of the Computer Science volume
- The many dimensions of communications involving the work of the Education Council
- More firmly placing the ACM at the heart of computing education in higher education
- Publications involving the Council (Transactions, handbook, etc)

Beyond these matters there will be a panel of international experts who will give their views and perceptions as they relate to the work of the Education Council. It is rather important that there should be a deep dialogue with appropriate members of the international community to address matters such as their needs. In this way the Education Board / Council will be better placed to serve those needs and thereby to retain a leadership position within the wider community. Of course, the choice of panel members will be crucial in this regard. In addition, the opportunity will be taken to try to learn lessons from their experiences. But additionally such a meeting may serve to provide concrete information to dispel negative images associated with working in the discipline. Some of the output here can feed through to curriculum developments but hopefully also to the careers web site.

Communications issues

Communications within the Education Board / Council and between this and the wider community is a crucially important matter that will influence the effectiveness and the reputation of the Education Board / Council. This needs to be addressed in a systematic manner with steps being taken to ensure the sustainability of the arrangements. To date a newsletter has been provided, but this needs to become a more regular feature of Council activity. It is expected that the timing of reports from the different groups will be staggered and will appear every two months to inform members of progress on different action items. But links with the SIGs and with other aspects of ACM as well as the wider community need to be more carefully addressed.

Further Evolution of the Education Board and Education Council

The Education Council held its first meeting in June 2006. The Education Board is now functioning properly in a management capacity and is cohesive. But we do need to be more effective in terms of making a difference that is visible to the community. There will always exist the need to build a greater sense of momentum in the Council and efforts there are continuing.

With the experience gained of the operation to date, it is timely to consider a modest readjustment of the membership of the Education Council. It is planned that this should take place prior to the next meeting of the Council (in December 08). This needs to be handled rather sensitively; it is the first such adjustment and it will be important not to dis-affect those who have contributed to date. The parameters of the adjustment will be

- Including representatives of key SIG groups, notable SIGGRAPH, SIGCHI and SIGPLAN
- Including the editors of the (soon to be) new *Transactions in Computing Education*
- Increasing industry representation on the Board
- Asking certain folk to stand down

2.2 Supporting K-12 efforts

Building on the success of the brochure

The production of the brochure and the linked web site has been a high profile activity that seems to have had a beneficial impact. Every piece of feedback has been entirely positive. There are certainly indications from the top institutions that there is a recent alleviation of the enrolment problems. However, it is far too early to make sweeping claims; moreover, there are still indications of considerable problems in other institutions. The Education Board / Council is currently seeking to gather statistics to provide a true picture of the situation.

Meanwhile developments of the web site are continuing. The oversight for the ongoing development and evolution of the web site has been vested in one of the Task Forces of the Education Council. It is important for that Task Force to keep in mind the specific issues facing K-12 education and the need to work closely with CSTA. The material on the web site has been refined to provide more helpful information; profiles of students from different institutions including pictures and quotes have been included; cross links to other relevant sites (e.g. to include video) have been provided; and, generally efforts have been made to make it more attractive to the younger generation. All this is continuing. We have sought to populate the Task Force with people who are imaginative, forward-looking, and action-oriented. The chair of that Task Force is now Robb Cutler who can bring his experience from the high schools situation and who can use his contacts with CSTA to advance that work.

It remains important to consider how to build on this successful collaboration between the Education Board / Council and CSTA to drive home benefits. In the first instance, a decision needs to be taken on whether further mailings of the brochure to high schools would be beneficial. It also has to be a primary goal to identify ways in which the web site can be made more effective in reaching its audience. This will be wasted effort unless we can be certain that the web site is being used and drawing its existence to the attention of interested parties has to be a key consideration.

AP initiatives

The ongoing discussions about the AP Computer Science exams are important for computing in the US; a decision had been made by the College Board in Spring of this year to discontinue the AB exam (a second exam in Computer Science) from May 2009 on the grounds of small numbers of students taking the exam and its overall impact on minority students. So to be precise from May 2010 there will be no AB exam; only the AP Computer Science A exam will be available. Both Mark Guzdial and Owen Astrachan in conjunction with Chris Stephenson from the Education Board / Council are active in providing advice and guidance to the Colleges Board to look at the best way forward as far as future Computer Science exams are concerned.

2.3 Two year college education committee plans

In FY09 the Two Year College Education Committee plans to pursue the following activities:

- conclude an associate -degree transfer guidelines in computing report that will initially include CS, CE, and SE, and eventually also include IS and IT once those baccalaureate reports are update and approved by the ACM Education Board.
- initiate a major undertaking to craft an associate-degree career guidelines in computing report and companion pedagogy compendium.
- attend the NSF funded SAME-TEC 2008 Seamless Connections convention as well as present already-accepted poster session at the annual SIGITE conference to continue research and collaboration efforts toward crafting the associate-degree curriculum guidelines in Information Technology.
- if the NSF grant proposal is funded, conduct Strategic Summit on the Computing Education Challenges for Community Colleges as well as produce and disseminate the proceedings.
- continue its dissemination and outreach activities, including mailings, website enhancements, conference sessions and exchanges with colleagues, as well as continuing our SIGCSE Inroads column and participating with the ACM Education Council by presenting at the December 2008 meeting in San Diego, CA.

2.4 Undergraduate curriculum efforts

Within the Education Board / Council a dialogue has started on whether the current five-volume strategy employed within CC 2001 remains appropriate. That is an important discussion and it will evolve over the coming year. It is fundamental to the strategy that needs to be adopted generally regarding curricular guidance.

2.4.1 Computer science

The work of the interim review of the 2001 Computer Science volume is now complete and publication will take place in the coming weeks. As indicated previously, this has been the first attempt to undertake an interim review and the lessons that have been learned will feed through to other such activities in due course.

An important outcome of the interim review is the realization that a more fundamental activity needs to be launched in the near future to produce a new Computer Science volume. This will then maintain the well-established tradition of undertaking such an activity on a 10-yearly time scale. It is intended that this will be carried out jointly with the IEEE Computer Society and will maintain the ACM/Computer Society leadership role in terms of curriculum guidance.

Key concerns here are the choice of team to undertake this work and setting the context in which that should be done. It would be important that such an endeavor should build on earlier work, notably that of the recent interim review. For in many instances, as the interim review drew to a conclusion there was a recognition that radical change was needed, but the constraints of the interim review process rendered major adjustments undesirable from a range of perspective (resources, practicality, causing undue turbulence in the community, etc).

2.4.2 Information systems

The plans for furthering the development of the IS curriculum include

- In August 2008 there will be a panel presentation at AMCIS 2008 focusing on the revised learning outcomes; indeed at the time of writing it can be reported that the task force has received confirmation regarding the project direction but also some concerns have been expressed regarding the role of the traditional content
- From September 2008 until early December 2008 there will be at least (planned, and in progress) two rounds of solicitation of public feedback on specific curriculum issues and incorporation of the results in the product
- The first complete draft is due to be produced by December 9, 2008
- In December 2008 (planned, proposal submitted) there is a plan to present the first draft at AIS SIG-ED (IAIM) conference
- During January till February 2009 it is planned to gather feedback collection and engage in rewrites
- Between March and April 2009, it is planned to submit the final document for approval

2.4.3 Information technology

Work on this volume is now complete. The final version of the volume will be prepared by the Information Technology Steering Committee for approval by the Education Board in the Fall. Responses to all comments received from the community will be published on the website.

2.5 Masters initiative

It is intended that the group undertaking this Masters initiative will report in FY 09.

2.6 Extending the leadership role

Having started a number of initiatives here, it is important to build momentum and, where relevant, do

so in a manner that is sustainable.

Computing Education Summit

The Planning Group for the Summit consists Mark Guzdial, Jane Prey, Heikki Topi, Harriet Taylor, Joe Urban and Andrew McGettrick. Work has started and it is important that this is seen to be successful. Beyond the production of a publication, it is likely that the Summit itself will give rise to other activity and commitments. It will be important for the Education Board to respond here as needed. Within the Education Board / Council some thought has been given to the outcomes of the Summit.

Recently, the enrollment declines appear to have stopped in some quarters, and there is a certain amount of anecdotal evidence regarding local increases at some institutions, but there is no evidence suggesting that students are returning to computing programs in large numbers. At the same time, computing continues to increase in importance in the context of various types of human endeavors, including engineering, business, government, not-for-profit organizations, and other sciences. It is easy to demonstrate that maintaining and further developing capabilities in computing is vitally important for all societies, particularly because of the very significant role of computing as the enabler of creative activities.

Several important players in the field of computing have addressed the enrollment crisis in a variety of ways. Industry leaders, including Microsoft Chairman Bill Gates, have acted as evangelists for computing disciplines (particularly computer science); companies and professional organizations have developed programs to attract students to computing (such as the SIM/Microsoft Future Potential in Information Technology program); major firms in the industry have supported important initiatives to attract attention to the program and communicate about it to a variety of audiences (such as imageofcomputing.com and ncwit.org); National Science Foundation has recognized the importance of the issue, as indicated by the CPATH program and major funding for programs such as the Empowering Leadership Alliance; various academic and professional computing societies have launched their own initiatives (such as ACM's brochure and computingcareers.acm.org website projects and several ongoing initiatives within AIS); and a number of universities have invested a lot of time and money in marketing their own programs. The issue is certainly getting a lot of attention, but the various initiatives are not coordinated and do not seem to link to each other as well as they could.

The ACM Education Board now has funding from NSF to lead this summit to bring together a group of key players interested in promoting computing. This type of a meeting could serve a useful purpose just as a venue for the various actors to learn to know about each others' work. It should, however, also lead to immediate coordinated action. The types of questions that need answers include:

- How do we integrate existing initiatives so that they get the best possible visibility?
- Can there be a comprehensive study that integrates what is known about the enrollment crisis in computing?
- How do we transform the results of the study into a form that creates a compelling case that will receive attention in national media?
- Can we find the resources to design and implement a web site or sites so that there is a very high quality interactive and dynamic web presence for the initiative? Ideally the site(s) should bring members of the target audience back repeatedly and have the effect of creating a social network.
- How can the message be presented to the political decision makers in a compelling way that demonstrates the critical importance of the issue from the perspective of national competitiveness?
- How can a systematic message from the leading companies in the IT industry and other industries be sent out regarding the continued need for professionals with a very strong background in computing?
- Overall, how do we reach the target audience (middle and high school students and college freshmen and their parents; relevant guidance counselors) in a way that genuinely changes their thinking? We might need a national media campaign that would cost a very large amount of money. How can we get this funded?

It is clear that one meeting will not change things overnight, but it is crucial that the meeting would have beneficial outcomes in the form of a list of significant action items and commitments to execute them. The Education Board / Council will need to be alert to the need to take action as necessary. In preparation for this, there will be a close interest in Peter Denning's conference to be held in Silicon Valley from 12th to the 14th January 2009 on Rebooting Computing.

Publications

Work on the proposal for the new *Transactions in Computing Education* is well advanced. Allied with this, the two editors of this Transactions will be invited to become members of the Education Council. In this way it is intended that the Education Council should more easily support and contribute to the promotion of a successful Transactions. There is an important issue here regarding the sustainability of the new Transactions.

Additional activity

The plans under international activity also feed through to enhancing this leadership role – the China Summit, the international panel at the Education Council meeting in December 08 and so on.

2.7 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

- Members of the Education Board / Council are involved in the planning of the Informatics Europe annual summit which is being held in October in Zurich
- Again members of the Board / Council are heavily involved in the organization of the third Informatics Education Europe conference to be held in early December in Venice, Italy
- The Euro-Inf project is nearing completion and steps are being taken by ASIIN within Europe to set up a more permanent accreditation activity based on the results of the Euro-Inf project. Members of the Board / Council are involved in the monitoring of this.
- Developments associated with the Seoul Accord are being carefully monitored
- There is ongoing planning and implementation of the China Summit at Tsinghua University in Beijing. The possibility of making this an annual event will be investigated.

Beyond this it is planned that an international panel session will take place at the next Education Council meeting which is planned for San Diego in December 2008. It is intended that this should involve a group of international experts making presentations and highlighting the issues that are most relevant for them; this would then be followed by a discussion session. This builds on similar successful sessions involving industrialists and employers; these have been a feature of previous Education Council meetings.

2.8 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. In particular, some of the new activity within the Council has this as a central focus and concern. Thus there is the Computing + X project which is concerned with degrees whose focus is not purely computing and there is the "First Year" project.

Establishing connections with other disciplines

As computing becomes more integral to a range of disciplines, it seems likely that computing education will increasingly become more closely tied to education in other areas. These developing connections may develop in several ways:

- By absorbing aspects of other disciplines into computing, which continues to evolve as a discipline
- By expanding the breadth of training we offer to computing students so that graduates can provide effective support in other areas, including science, engineering, economics, business, and education.
- By encouraging students to take a broader set of electives as part of their overall program of study

- By increasing the number of computing courses designed for students in other disciplines who will require those skills

These developments have the potential to lead to new kinds of degree programs.

Addressing first year courses

One problem that is widespread is the failure rates in many first year classes leading to problems of retention within the discipline. These tend to spring from students having a distinct lack of interest in the courses being offered at that stage. The reasons for this are important and tend to hinge around: a lack of interest in the topic; a course which failed to meet their expectations; a course that lacked challenge and motivation; or even a course that contained material with which the student was already familiar.

Within the Education Council there is an activity now addressing the whole issue of first year classes and its findings should prove interesting.

2.9 Continuing to foster a positive image

The Education Board and 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 reversal of recent 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. Robb Cutler is now heading up this public image task force and he is investigating what other sections of ACM and other societies are doing about the image of computing.

We believe that this process will proceed by identifying 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. The overall success of this endeavor will almost certainly require experimentation with many models, not all of which will succeed individually. The goal is to promote a diversity of strategies and then to let individual institutions choose models that are likely to work well in that environment.

2.10 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 for two reasons:

- The community needs to be informed about the changes that have occurred and the reasons underlying those changes
- At this time in which so many people in computing education feel threatened by declining 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. By showing our support for the community, we will also be in a better position to enlist their aid in solving the many problems we all face.
- The Education Board / Council need to firmly establish 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.

Appendix A
Roster of the Education Board and Education Council (FY08)

Education Board

Andrew McGettrick, Strathclyde University (Chair)
Boots Cassel, Villanova University
Dan Garcia, University of California at Berkeley
Mark Guzdial, Georgia Tech (Vice - Chair)
John Impagliazzo, Hofstra University
Jane Prey, Microsoft
Eric Roberts, Stanford University (past chair)
Larry Snyder, University of Washington
Heikki Topi, Bentley College

David Schneider, ACM Staff Liaison for the Education Board
Lillian Israel, ACM Director of Membership
Chris Stephenson, Executive Director, Computer Science Teachers Association
Gordon Davies, Coordinator of ACM European Education Initiative

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

Owen Astrachan, Duke University
Gordon Bailes, East Tennessee State University
Michael Caspersen, Aarhus University, Denmark
Jan Cuny, University of Oregon/NSF
Robb Cutler, The Harker School/CSTA
Peter Denning, Naval Postgraduate School
Sally Fincher, University of Kent, England
Dan Garcia, University of California at Berkeley
Roscoe Giles, Boston University
Beth Hawthorne, Union County College (TYCEC)
Maggie Johnson, Google Inc.
Robert Jones, Intel
Lisa Kaczmarczyk, University of California at San Diego
Deepak Kumar, Bryn Mawr College
Jim Kurose, University of Massachusetts
Han Reichgelt, Southern Polytechnic State University (SIGITE)
Rich LeBlanc, University of Seattle
Terry Linkletter, Microsoft
Jose Maldonado, University of Sao Paulo, Brazil
Ken Martin, University of North Florida
Barbara Price, Georgia Southern University
Eugene Spafford, Purdue University
Carol Spradling, Northwest Missouri State University
Joe Turner, Clemson University (retired)
Patrick Walsh, IBM
Jeannette Wing, Carnegie Mellon University
Alison Young, Auckland University of Technology, New Zealand