

ACM Education Board Annual Report Fiscal Year FY 2002

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Submitted by Peter J. Denning
Chair of the Education Board

Membership of the Board 2001-2002

Chair.....	Peter Denning
Vice-Chair.....	Richard LeBlanc
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	Lillian (Boots) Cassel
	Gordon Davies
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	Eric Roberts
	Larry Snyder
Headquarters Liaison.....	Fred Aronson

Standing Committees:

Accreditation.....	John Impagliazzo
College Education.....	Russell Shackelford
Pre-College Education.....	Robert Cartwright
Professional Development	Gordon Davies
Self Assessment.....	[vacant]
Two-Year College Curriculum	Robert Campbell

Task Forces:

Computer Information Systems	John Gorgone
	Gordon Davis
K-12 Task Force	Chris Stephenson

Representatives:

Computer Science Accreditation Board (CSAB) Directors	Robert Cannon
	Della Bonnette
	Kenneth Martin
	Neal Coulter
Institute for Certification of Computer Professionals (ICCP) Directors	Joyce Currie Little
	Jan B. Wilson

Scope

The ACM has been called on to respond in new ways to the education needs of the Information Technology Profession (ITP). People with diverse educational needs now look to ACM for US and international leadership in K-12 (pre-college) education, professional education, certification of basic IT skills, certification of professional skills, and self-assessment. Accordingly, the Ed Board prepared an Education Strategic Plan for ACM, which was approved by the ACM Executive Committee and Council in May 1999. The main points of the Education Plan are summarized in Table 1. Although this plan is strongly influenced by experience in the USA, the Board is well aware that the concerns and issues raised transcend national boundaries. The Board works with international groups in these areas.

For many years, ACM's education involvement was primarily focused on universities, which were the fastest growing education sector and in the greatest need of curriculum guidelines. In the past decade, other sectors have taken off, including K12, Two-Year Colleges, accreditation, and Professional Development. The strategic plan is broad and comprehensive, covering ACM involvement in all these sectors.

Budgeting and Staff Support

The Board worked with the Executive Committee to develop an annual budget that enables action on the strategic plan.

TABLE 1: Summary of Education Strategic Plan

Grand Challenge	Proposed Ed Strategic Directions
<p>A How to interest qualified, talented students to go into the IT field or extend their interest in other fields to include IT.</p>	<ul style="list-style-type: none"> • Advanced Placement: AP Test and Curriculum for Computing • HS computing curricula for those not in AP programs. • Work closely with other groups to develop guidelines and networking for K-12 teachers. • Stimulate greater interest among women for IT careers (work with ACM Women & Minorities committee.)
<p>B How can higher education satisfy the needs of industry and government for IT innovation, IT professionals, and high-level computing capabilities in other fields.</p>	<ul style="list-style-type: none"> • Curriculum recommendations for colleges and universities(CC2001: core, software engineering, computer engineering, information systems, two-year colleges). • Academic-corporate university partnerships: Encourage partnerships between corporate education and higher education (e.g., accrediting partnership programs); work with accreditation groups (e.g., CSAB) and corporate universities (e.g., CorpUX). • Encouraging professional mastery: Define the role of practices and mastery in the IT specialties and recommend curricula. • Pathways to specialties: Recommend new ways for educators to accommodate the many pathways to professional specialties. • Supply of IT workers: Work with IFIP to define guidelines for education in IT skills.
<p>C How can IT and other professionals maintain a current level of knowledge of IT and maintain certification where appropriate.</p>	<ul style="list-style-type: none"> • Establish and maintain an online Professional Development Centre to offer on-line courses to members. • Resurrect Self-Assessment programs and link them to the PD Centre. • Certifications for the public. Establish guidelines for review or endorsement of non-ACM certification programs (work with ICCP).
<p>D How can IT professionals present IT as an attractive field for a career choice and establish public appreciation of the importance and benefits of IT.</p>	<ul style="list-style-type: none"> • Establish and maintain a Career Development Centre. • Work with IFIP to define and disseminate definitions of IT skill sets.

Projects

Following are summaries of the projects active in 2000; their headlines appear in the table above. They are cross-indexed to the main tracks in which they appear (A, B, C, and D).

A-1. Advanced Placement (Cartwright)

In FY 2001, the College Board decided to revise the AP curriculum to focus on object-oriented programming with Java as the exemplar language. The College Board charged the Computer Science Examination Development committee to define a syllabus, the Java subset, and design the exams. We entered FY2001 with two concerns. (1) The Development committee would dilute the recommendation to where it was barely distinguishable from the current, procedure-oriented programming paradigm. However, their recently release Java subset definition reveals that the curriculum will contain substantial object-oriented programming content. This concern is significantly diminished. (2) Insufficient resources would be channeled to retraining teachers away from C++ and into the new Java subset. Many different organizations have since offered summer workshops in Java for AP high school teachers. We are therefore optimistic that all teachers will receive the proper training.

Further improvements in the AP CS curriculum will depend on new textbooks, teaching materials, teaching tools by educators. The policy impediments have been removed. The new syllabus will be compatible with good programming pedagogy and practice.

A-2. K12 Programs (Stephenson)

The Task Force initiated a web-based survey for high school computer science educators on resources needed for instruction and professional development. Over 1000 teachers were informed of the survey via selected listservs, with 170 responding. The collected data are being used to determine priorities for Task Force projects.

The Task Force cooperated with ISTE in the development of the ACM ISTE 2002 Computer Science and Information Technology Symposium. The Symposium was part of the National Educational Computer Conference (NECC) in San Antonio in June 2002. This Symposium provided professional development for 100 secondary level educators on topics such teaching I/O in Java, curriculum design, hands-on robotics, computer interfacing, ethics in the age of Napster, and web design issues. ACM and ISTE are planning the 2003 meeting.

The Task Force Chair secured \$60,000 in funding to support the 2003 CS/IT Symposium jointly sponsored by ACM and ISTE. The event will be held in Seattle in June 2003.

The Task Force sub-committee on Curriculum Development held its first meeting in New Jersey under Chair Allen Tucker. This committee is preparing a curriculum document for a non-AP high school course model.

The Task Force sub-committee on Curriculum Development initiated a web-based survey for high school computer science educators on curriculum and course content. Over 1000 teachers were informed of the survey via selected listservs. The sub-committee will use these data to plan its national roll-out of its new model curriculum.

The Task Force completed a revised draft of the proposal for the JETT (Java Engagement for Teacher Training) project.

The Task Force has helped plan the first ACM High School Computer Science Conference in South Africa (September 19-20, 2002). The conference will feature two days of presentations by ACM representatives and local high school and university computer science educators.

The Task Force organized a meeting of university and high school educators concerning the JETT (Java Engagement for Teacher Training) project, which is developing a pilot training session for high school teachers seeking to improve their knowledge of object-oriented programming and Java. This meeting will be held in September 2002 at ACM headquarters.

B-1. Curriculum Recommendations

ACM has long been a leader in developing, disseminating, implementing and evaluating model curricula.

Computing Curriculum 2001 (Roberts) This year we completed the Computer Science volume of the Computing Curricula 2001 report. The final 236-page report was released on December 15, 2001 and thus appeared in the year originally targeted for its completion.

The major accomplishments of the project include:

- Established a strong partnership between ACM and IEEE-CS
- Completed a survey and evaluation of the impact of CCU91
- Articulated a set of principles to guide our work
- Created a structure (KFGs and PFGs) for broad participation
- Secured funding from NSF to support a review meeting
- Developed a body of knowledge (BOK) for undergraduate CS
- Defined a set of core topics for all CS undergraduates
- Outlined learning objectives for each unit in the BOK
- Specified a list of over 80 courses for undergraduate CS
- Identified desired characteristics for CS graduates
- Implemented web resources to complement written report
- Integrated feedback from conference sessions into the report

- Published three public drafts on the way to the final report

The report has apparently been well received both in the United States and internationally. At the IFIP WG3.2 Working Conference on Informatics Curricula, Teaching Methods and Best Practice (ICTEM 2002) in July 2002, several delegates from different parts of the world indicated that the report was having a major influence on curriculum design in their countries.

The CC2001 Two-Year College report was completed in July 2002. Work continues on the other proposed volumes in the CC2001 series (Computer Engineering, Software Engineering, Information Systems). Once these reports have been completed, the CC2001 project plans to release an overview volume outlining the commonalities among these disciplines.

Software Engineering (LeBlanc): A new organization was created during the summer of 2001 to succeed the Software Engineering Education Project (SWEEP) in managing the task of developing curriculum recommendations in Software Engineering. Since the result of this effort will be one of the volumes in the Computing Curriculum set begun with the Computer Science volume approved in late 2001, the project is being called Computing Curriculum – Software Engineering (CCSE).

The CCSE Steering Committee is being led by co-chairs Richard LeBlanc (ACM) and Susan Mengel (IEEE-CS). The Steering Committee has a strong international flavor, with participants from Canada, Israel and the UK, plus official representatives of the British Computer Society, the Australian Computer Society and the Information Processing Society of Japan. Since there are well-developed software engineering education programs in all the countries represented by these societies, the resulting curriculum recommendations should gain significant credibility by their participation. A complete list of the committee members and a description of current project activities can be found at <<http://sites.computer.org/ccse/>>.

The primary work of the Steering Committee during the past year was the development of an organizational structure for volunteers and initiation of an effort to define the body of Software Engineering Education Knowledge (SEEK) that will provide the basis for our curriculum recommendations. An initial draft of the SEEK was produced by groups of volunteers in the Spring. A workshop was held in Chicago in June (with support from NSF, ACM and IEEE-CS) to refine the draft by bringing together representatives of all of the knowledge area volunteer groups and the steering committee.

Public review of the SEEK description and the beginning of work on the actual curriculum recommendations are at the top of the agenda for 2002-03. The goal of the CCSE Steering Committee is to produce final curriculum recommendations by the end of 2003.

Computer Engineering (McGettrick): This joint effort with the IEEECS intends to contribute a volume on computer engineering to the CC2001 library. It got off to a slow start. Its only activity was to hold an organizational meeting in early summer 2002.

Curriculum Planning (Shackelford). This committee is overseeing the coordination of all the projects that are contributing new volumes to the CC2001 library. These include Software Engineering, Computer Engineering, Information Systems, and Two Year College guidelines. The committee also plans to produce the “overview volume” for the entire CC2001 library.

WCCE01. Board members Denning, Cassel, LeBlanc, Roberts, and Davies participated in the IFIP World Congress on Computing Education in August 2001. Denning presented a paper on the organization and design of IT schools. Cassel chaired a working group on distributed expertise in teaching. Roberts, with support from the others, presented the CC2001 report, which was received favorably by the international group, and collected feedback that was used in the final revision. The Ed Board co-hosted a reception following the CC2001 panel session; 50 people attended and continued the CC2001 discussion.

ICTEM July 2002. IFIP WG 3.2 sponsored a conference in Brazil about the best practices of teaching computing. Boots Cassel and Gordon Davies chaired a working group on the proliferation of computing programs of varying types and the need to encourage innovation and experimentation without sacrificing quality. Rich LaBlanc and Eric Roberts were participants.

Snowbird July 2002. Board members Boots Cassel and Rich LeBlanc attended the CRA department chairs meeting. Cassel participated in panels on publishing (JERIC and CITIDEL) and professionalism (especially the accreditation aspect). Denning organized a panel on the IT profession and its implications for curriculum; the panel was chaired in his unexpected absence by Susan Merritt.

Information Systems (Gorgone): The status of our current project is summarized below.

- **IS 2002:** Teaming with the Association for Information Systems (AIS) and Association of Information Technology Professionals (AITP), the CIS Task Force is creating IS 2002 by updating IS '97, the model curriculum and guidelines for undergraduates for inclusion in the CC 2001 report. The main sections of draft report are completed. A few details remain (copyright form, contacting endorsing organizations, etc.) before the report can be submitted to ACM, AIS and AITP. We submitted a one-page description of the information systems field to CC 2002 overview committee.
- **MSIS 2000 (Graduate IS curriculum model):** With minor updates, a MSIS 2002 report can be completed for inclusion in the CC2001 project. A meeting with AIS to form a joint task force will take place in next year.
- **IS Accreditation:** With NSF support, ACM has successfully teamed with AIS, IEEE-CS, CSAB, and industry representatives to develop a set of criteria for accrediting Information Systems programs. The information systems accreditation criteria was approved by the ABET board and is posted at www.abet.org. Information Systems Program Evaluators have

been train and the first IS Accreditation cycle has been completed during 2001-2002. Presented a status report to the MIS (Management Information Systems) department chairs at their annual breakfast meeting in December 2001 at the International Conference for Information Systems.

Our plans:

- IS 2002: Submit the final report by end of 2002.
- MSIS 2000: Provide a minor update of MSIS 2002 in 2002-2003 for inclusion in CC2001 project.
- IS Accreditation: (1) Continue to Identify programs interested in IS accreditation. (2) Continue to encourage mainstream IS faculty to become program evaluators.
- MBA/IS: Continue going discussions with AIS to complete an MBA/IS Concentration/Major. Select and appoint an ACM/AIS joint membership committee. The committee will develop a four-course IS concentration for MBA programs, including the first overview IS course required of all MBA programs.
- International IS Curriculum: Continue going discussions with both AIS and AITP regarding a joint international IS curriculum project. Begin Joint ACM, AIS, AITP Global IS curriculum Task Force.

There are on going discussions with both AIS and AITP regarding a joint IS major revision of the undergraduate curriculum as IS 2002 reflect only a 20% to 25% update of IS 1997.

Two-Year Colleges (Campbell): The ACM Two-Year Education Committee can reports the following accomplishments in fiscal year 2001-2002:

- The “2002 Guidelines for Associate Degree Programs in Computer Science” were concluded and approved by the ACM Ed Board in Summer 2002. This is a companion work to the recent CC2001 as well as an update to the 1993 “Computing Curricula Guidelines for Associate Degree Programs in Computing Sciences”. Certainly this is a milestone work, the product of a great deal of effort and excellent collaboration with numerous individuals and groups from October 2001 through August 2002, with final Ed Board approval in August 2002
- Bob Campbell and Beth Hawthorne of the TYC committee participated in the NSF/AACC sponsored workshop on the Role of Community Colleges in Cybersecurity Education in June; they also co-authored a paper that is to be published as part of the proceedings. Campbell also served as a member of the steering committee for this effort, and as a panelist and session chair. Follow-up sessions nationwide are being planned by AACC, with Campbell continuing to serve as a presenter.
- Karl Klee of the TYC committee conducted a poster session in June at the SIGCSE summer symposium promoting the curriculum efforts of the Committee, notably the Guidelines for Computing in a Networked

Environment and the Guidelines for Associate Degree Programs in Computer Science.

- Fay Cover of the TYC committee continued to serve on the CC2001 task force as a liaison to the Committee and to represent the community college sector in the ongoing meetings and email discussions conducted by the CC2001 task force until the conclusion of their work in fall 2001.
- Fay Cover of the TYC committee served as the liaison to the IEEE-CS two-year college committee; in she was able to secure a commitment for funding for national distribution of the Committee's curriculum report on Guidelines for Associate Degree Programs in Computer Science.
- Beth Hawthorne of the TYC committee served on the ACM Ed Board Software Engineering curriculum task force, participating in their meeting at SIGCSE in March, and via email.
- The TYC committee website was significantly revised in May 2002 for greater ease of use, to better reflect the Committee's work, and to serve more effectively as a resource to the two-year college community.
- Throughout the year the TYC committee continued to field calls and email messages from colleagues in community colleges across the US seeking advice and guidance, as well as representatives for a variety of initiatives.

B-2. Accreditation (Impagliazzo)

This is the last year for the Accreditation Committee. Because the primary work of accreditation has been handed over to CSAB, the original mission is now completed. At the recommendation of the committee and the Ed Board, the EC approved dissolution of this committee effective July 1, 2002. In the past year, the committee assisted CSAB as it has in the past by selecting over a dozen new program evaluators (PEVs) to serve on computing accreditation visits of ABET (to which CSAB belongs). These individuals included professionals from computer science information systems, and software engineering fields. Their selection was a mutual effort between ACM and the Computer Society of IEEE.

Because of the final integration of CSAB into ABET, the responsibility of selecting and recommending program evaluators for accreditation visits became the responsibility of CSAB's Program Evaluator and Program Criteria (PEPC) Committee. A subcommittee of PEPC is now responsible for PEV selection and recommendation. John Impagliazzo, eleven-year chair of the Accreditation Committee, represents ACM on the PEPC committee through the Education Board.

B-3. SIG on IT Education (Cassel)

Boots Cassel and John Gorgone represented ACM at the meeting of IT Educators in Savannah (June 2002). This group consists of representatives of all the US BS/IT programs and was organized by Rochester Institute of Technology. Their primary interest is to develop curriculum guidelines for BS/IT programs and to create accreditation guidelines for these programs.

They were considering forming their own society. Cassel and Gorgone represented ACM to the group and representatives of IEEE-CS represented the competition. At the end, the group decided to affiliate with ACM as a SIG. The SIG Board has been working with them to form SIGITE (information technology education) and are close to closure. The Ed Board will sponsor their curriculum development and has appointed one of their members (Barbara Price) as a CSAB alternative director.

C-2. Professional Development (Davies, Aronson)

In line with the adopted business plan, progress was being made on setting up partnerships with course providers to allow ACM members discounted subscription rates on courses. Negotiations with Sun Educational Services (SES) were at an advanced stage in that regard. However, in January, a new arrangement was pursued and agreed upon by ACM and SES whereby ACM would pay a set fee to SES and a fixed number of SES and other third party web-based courses from DigitalThink and Telecommunications Research Associates would be provided free of charge to ACM Professional Members. This is considered to be a very valuable new benefit for members.

It is now expected that 200 free courses will be available to Professional Members via the new ACM Professional Development Centre in early fall, 2002. Course topics include Java, C and C++, Object-Oriented Programming, Telecommunications, e-Business, Networking and Security, and Project Management. Also, a subset of those courses will be available free to ACM Student Members. In addition, the arrangement will allow all ACM members to subscribe to a larger set of additional courses at a discounted rate.

Negotiations are now progressing with other course providers to allow a wider variety of courses to be made available to ACM members at a discount, including those in the management area.

A new Professional Development committee will be set up to work with HQ staff to monitor and evaluate the program, recommend new areas and partners for development and consider alternative methods of delivery.

D-1. IT Skills (Davies, Denning)

The Education Board has contributed significantly to the forthcoming joint conference sponsored by IFIP, OECD and WITS to be held in the UK in October 2002. The conference is supported by ACM, BCS, CEPIS, CompTIA, SEARCC and intellect. Gordon Davies has been closely involved in the conference and Peter Denning contributed significantly to the planning of the agenda. Three members of the Education Board (Denning, LeBlanc, and Roberts) have been invited to represent ACM at the workshop. The workshop is by invitation only and is entitled *Meeting Global It Skills Needs- The Role Of Professionalism*. The conference will examine three key issues:

- Demand - What are the IT Skills Needs?
- Supply - How are these Skills Achieved and Validated?
- Constraints - The International Market: Globalization and Mobility

The conference will review the current situation and seek opportunities to initiate global collaborative action in areas including:

- IT Occupational Skills Frameworks
- IT Skills Certification
- Availability of IT Professionals

D-2. IFIP World Congress Travel Grants (Aiken)

The ACM, in co-operation with the IEEE-Computer Society, prepared a proposal to NSF requesting travel support for US participants (particularly young researchers and minorities) to attend the 17th IFIP World Computer Congress (Montreal, August, 2002). A selection committee consisting of two Education Board members (R. Aiken, Chair and J. Impagliazzo) and a representative from the IEEE-CS (J.A.N. Lee) chose ten participants to receive funding.

D-3. Professional Practices and Qualifications (Impagliazzo)

One of the four main strategic directions of the Ed Board is support of IT professionalism (see chart). The Accreditation Committee has served as a focal point for IT professionalism within the Board. With its passage, however, the board asked Impagliazzo to formulate a proposal for a new committee explicitly dedicated to professionalism. In June 2002, a draft proposal was discussed with the EC, who felt it was not ready and asked the Board for a revision and for clarification of what projects this committee would sponsor. Two projects are currently under consideration:

1. Develop a plan to keep ACM and its member informed about the activities surrounding professional certification.
2. Develop guidelines for curriculum tracks in value dynamics (Denning).

Major Actions

June 2001:

ACM/ISTE CS/IT symposium (Stephenson)
Sponsored secured for ACM/ISTE symposium 2002 (Stephenson)
IS 2002 undergraduate IS curriculum, and IS accreditation, status discussed at Americas Conf. IS (Gorgone)

July 2001:

K-12 Task Force Allen committee on curriculum development (Stephenson)

August 2001:

Web based survey of HS CS educators (Stephenson)
Steelman version of the CC2001 published (Roberts)
Formation of new CCSE Steering Committee, including representatives from three national societies plus ACM and IEEE-CS (LeBlanc)

September 2001:

CCSE Steering Committee completed (LeBlanc)

October 2001:

CC2001 report endorsed by ACM Council (Roberts)
CC2001 “unveiled” at Frontiers in Education Conference (Roberts)
Meeting with CSAB directors to discuss (a) Admission and membership of AIS to CSAB (b) pilot programs for IS accreditation, (c) training of IS program evaluators and (d) Information Technology. (Gorgone)
Draft Guidelines CS Assoc Degree programs (Campbell)

November 2001:

CC2001 report endorsed by the IEEECS Board of Governors (Roberts)
IS 2002, and Information systems accreditation, status discussed at Information Systems Ed. Conference (Gorgone)

December 2001:

IFIP travel grant proposal to NSF (Aiken)
CC2001 Final Report released (Robert)
Information systems accreditation preparation was presented at the International Conf. on Informatics & Research. (Gorgone)
IS 2002 principles, exit skills and courses presented at joint session of International Academy for Information Management & International conf. on Information Systems conferences. (Gorgone & Davis)
Accrediting MIS programs was presented at the annual MIS department heads meeting at the International Conference on Information Systems. (Gorgone)
Draft Guidelines CS Assoc Degree programs out for review (Campbell)

January 2002:

CSAB directors discuss information systems accreditation. (Gorgone)

February 2002:

- Preparing for information systems accreditation was presented at ACM SIGCSE conference. (Gorgone)
- Meeting with CIS Task Force members at Bentley College to complete the draft IS 2002 report. (Gorgone & Davies)
- Workshop at Conf of Software Engineering Education & Training (LeBlanc)

March 2002:

- IFIP travel grant program announced (Aiken)
- Draft of IS 2002 front section send out CIS Task Force for review. (Gorgone)
- Participated SIGCSE Softw Engr curriculum task force meeting (Campbell)

April 2002:

- BS/IT educators decide to affiliate with ACM as SIGITE (Cassel)
- CSAB directors discuss information systems pilot programs, information technology and future plans. (Gorgone)
- Information Technology curriculum group discusses an ACM SIG, IT curriculum & accreditation. (Gorgone & others)
- New Draft Guidelines CS Assoc Degree programs completed (Campbell)

May 2002:

- IFIP travel grant recipient awards announced (Aiken)
- Draft of IS 2002 Appendices to CIS Task Force for review. (Gorgone)
- New Draft Guidelines CS Assoc Degree programs to Ed Board (Campbell)
- Major revision to ACM TYC committee web site (Campbell)
- Draft body of SEEK, Software Engineering Education Knowledge (LeBlanc)

June 2002:

- IS 2002 front section draft to CIS Task Force for review. (Gorgone)
- Presented IS accreditation as a quality assurance dimension of the IS profession at the Informing Science and IT Ed. Conference. (Gorgone)
- Representatives of TYC committee participate in NSF/AACC workshop, Role of Community Colleges in Cybersecurity Education (Campbell)
- Karl Klee of the TYC committee conducted poster at SIGCSE summer symposium about TYC guidelines available from ACM (Campbell)
- NSF sponsored workshop to review and refine SEEK >draft (LeBlanc)

July 2002:

- CC2001 project presented at IFIP WG.23 conference in Brazil (Roberts)
- CC2001 project presented to CS Dept chairs at Snowbird (Roberts)
- Revision IS 2002 Appendices to CIS Task Force for review. (Gorgone)

August 2002:

- IFIP travel grant recipients attend 17th World Congress (Aiken)
- Final draft IS 2002 report on information systems curriculum presented at AIS Americas Conf. On IS. (Gorgone)
- Final version of Guidelines for CS Associate Degree Programs approved by Ed Board (Campbell)