



Voice

CURRICULUM

The Voice of K-12 Computer Science Education and its Educators

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Your Symposium Invitation

Chris Stephenson, CSTA Executive Director

Plans are now well underway for the sixth annual Computer Science and Information Technology (CS&IT) Symposium and the organizers are pulling out all of the stops to ensure that this is the best one yet.

The CS&IT Symposium is held every year in conjunction with a major educational computing conference such as the National Educational Computing Conference (NECC) or ACM's SIGCSE Conference. It features a full day of practical and cutting-edge professional development for K-12 computer science and information technology teachers.

This year's symposium, which will take place July 8, 2006 in San Diego, will feature top-notch keynotes and an expanded selection of breakout sessions. The conference keynote speakers will be Ellen Spertus (voted the Sexiest Geek Alive 2001) and Kevin Schofield, Microsoft's General Manager for Strategy and Communications. The breakouts will include sessions on

Flash programming, pair programming, Google, grant writing, Microsoft Vista, and Alice, just to name a few. We are also adding two BYOL (bring your own laptop) sessions, one on programming in .Net and the other on Wikipedia.

Attendees will also receive all kinds of giveaways and a chance at a range of great new gadgets (pocket GPS system, a portable DVD player, an mp3 player and an awesome wireless optical mouse and keyboard) in our annual raffle.

Registration for the CS&IT Symposium will begin in March. For more information, or to register for the symposium, please visit www.iste.org/profdev/symposia/cs/2006/.

Registration is limited, so be sure to register as soon as possible,

CS&IT 2006 is hosted by the Computer Science Teachers Association (CSTA) and the International Society for Technology in Education (ISTE) and is sponsored by Microsoft.

A Computer and Information Science Forum

Robert (Bob) B. Allen

The Computer and Information Science Forum (www.cisforum.org) is being developed as a portal for K-12 Computer and Information Science (CIS) teachers and students.

The first section of the portal provides links to a variety of topics.

- CIS Scientists and History - an eclectic sample of Web pages on notable CIS scientists to present a human face for

computer science.

- CIS Online Skill Resources - online games and projects for students.
- Clubs and Competitions - links and descriptions for clubs and events.
- Resources for Educators - lesson plans, policies, and other readings on educational issues.
- CIS Career Resources - materials for students on CIS careers.

IN THE NEXT ISSUE OF THE VOICE

International CS Education

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Letters to the Editor may be edited for space or clarification.



ACM founded CSTA as part of its commitment to K-12 computer science education.

COMPUTER/INFORMATION SCIENCE FORUM

continued

The aim is to cover a broad range of topics and resources with clear presentations appropriate to a variety of levels.

Although the breadth of CIS related fields is a challenge, the site emphasizes both technical and human aspects of CIS research. Technical topics initially will include algorithms, but will expand to topics such as networking, graphics, and design.

The second section of the CIS Forum portal presents weekly puzzles in several

categories for K-12 students. If there is interest, the site will continue to be developed so that it emulates the MathForum (www.mathforum.org) with human-mediated online services for interacting with students. A "Problem of the Week" service, through which students get personalized feedback about their responses to problems posted, or replies to their personal CIS questions, could also be added.

The CISForum site is under development and we welcome your feedback and suggestions. Reply to Bob Allen directly at allen@acm.org.

The Shrinking Pipeline

Angie Klein, William Jewell College

Computer Science (CS) education in high schools across the nation is a mix of good news and bad news. While there are more course offerings with diverse content in computer studies, there is still a lack of emphasis on computer science as a requirement for graduation. The mixed news comes from the recent survey by the Computer Science Teachers Association (CSTA) of 14,000 high school teachers who define themselves as educators in the field of computer studies.

The fall 2004 survey results (CSTA, 2005a; CSTA, 2005b) indicate that CS is introduced early in high schools, but primarily as an elective. Students may (26%) be required to take at least one course in computer related studies, but beyond that, other courses fulfill no graduation require-

ment. Students are faced with many elective options and many requirements. Having the latitude and desire to "fit it in" becomes the biggest challenge (43%).

Historically, Advanced Placement Computer Science (AP CS) education was the only source of programming exposure for students. Only 40 percent of the respondents offer AP CS courses and those who do offer these courses are continuing to experience a decline in student enrollment. Students who enroll in pre-AP courses are also less likely to enroll in AP courses. These results are consistent with reports of the shrinking academic pipeline, which is especially prominent among young women. While women represent 32% of pre-AP courses, they only represent

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CSTA Voice is a quarterly publication for members of the Computer Science Teachers Association. It provides analysis and commentary on issues relating to K-12 computer science education, resources for educators, and information for members. The publication supports CSTA's mission to promote the teaching of computer science and other computing disciplines.

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23% of the AP CS course population.

The lack of attraction to computer science as a potential career has affected enrollment. While the Department of Labor and most companies are seeing a rise in information technology related careers, the news and popular opinion reflect the view of a declining U. S. technology job market and growing use of offshoring. Thus students, counselors, and parents perceive fewer opportunities. Some CS jobs are being offshored but many technology careers are on the rise. According to Robert Half Technology, these include networking, database management, information security, and application development. Similarly, the U.S. Department of Labor shows an increase in the areas of telecommunications, computer manufacturing, and computer system design (Lee, 2005).

On the surface, the content of CS courses appears to mirror what is needed

Ultimately, CSTA would like to create a proposed set of nationally recommended standards...

in the IT profession. The most commonly-taught topics, in order, include programming (68%), hardware (60%), ethics (56%), graphics (46%), Web development (43%), and databases (35%). On the other hand, only 11% indicated "logic" as a topic covered in pre-AP courses. Additionally, 10% wrote in "applications" and many included "spreadsheets".

This emphasis on productivity applications, such as word processing and presentation software, in the pre-AP courses may be highly problematic for a number of reasons. Given the lag of technology within the classroom compared to that in most homes, students may become frustrated with that content. The focus upon computer studies as a skill set, rather than as a science also gives students a false impression of the discipline. Waiting until AP CS courses to hook the students into the science of computers may simply be too late. Supporting the expanding and changing careers in the field requires us to teach logic, ethics, critical thinking, and the use of computing for real-world problem-solving.

Additionally, the survey indicates that

teachers are unsure as to the certification requirements in their states (CSTA, 2005a; CSTA, 2005b). In many states, half of the respondents indicated there are no certification requirements, while the other half from the same state indicated that there are requirements. In addition, CSTA has received numerous queries from members interested in relocating to another state or enhancing their current state teaching certification to qualify them to teach CS, but they do not know where to turn for the answers on certification.

CSTA Executive Director Chris Stephenson says addressing this issue of teacher certification is a key priority for CSTA. "Certifications and Standards Committee Chair, Dr. Ghada Khoury, is now leading a major project to collect information about CS teacher certification requirements in every state. The goal is to collect

the information and present it in a clear consistent manner through a member-accessible database", say Stephenson.

Ultimately, CSTA would like to create a proposed

set of nationally recommended standards, consistent with the NCATE standards for teacher education that will serve as a model for all states. Stephenson says she hopes a set of standards will encourage all states to include "rigor in their standards for new teachers and to provide clearer and less arduous transition paths to CS certifications for others." Armed with knowledge, training, and continued support, teachers can provide curriculum that meets future industry needs and encourages students to consider computer-related careers.

References:

Computer Science Teachers Association (2005a). *Analysis of high school survey data*. Retrieved November 5, 2005, from www.csta.acm.org/Research/sub/survey_pdfs/CSTASurveyResAnaly.pdf

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Lee, Katherine Spencer. (2005). *Computer World Career Watch*. Retrieved December 1, 2005, from www.computerworld.com

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The editorial board of the **CSTA Voice** is dedicated to ensuring that this publication reflects the interests, needs and talents of the CSTA membership. Please consider sharing your expertise and love for computer science education by contributing newsletter content.

Potential writers for the **CSTA Voice** should send a brief description of the proposed article, estimated word count, statement of value to members, author's name and brief bio/background info, and suggested title to the editor at: cstapubs@csta.acm.org. The final length, due date and title will be negotiated for chosen articles. Please share your knowledge.

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<http://csta.acm.org>

ACM K–12 CS Model Curriculum

Developed in response to the pressing need to provide academic coherence to the rapid growth of computing and technology in the modern world, the *Model Curriculum for K–12 Computer Science* integrates computer science (CS) fluency and competency throughout the primary and secondary grades in a four-level framework.

Level 1 Foundations of CS

- ▶ Grades K-8
- ▶ Outcomes drawn primarily from the *National Educational Technology Standards*
- ▶ Includes expectations for problem solving and algorithmic thinking

Level 2 CS in the Modern World

- ▶ Grade 9 or 10
- ▶ A first computer science course for all high school students.
- ▶ A broad overview of CS to prepare students for the technological world
- ▶ Includes a fundamental understanding of operating systems, networks, the Internet, problem solving, programming, careers, and issues in computing ethics

Level III: CS as Analysis and Design

- ▶ A pre-AP course focusing on scientific and engineering principles
- ▶ Intended for students interested in pursuing more advanced studies in CS, Engineering, or Engineering Technology

Level IV: Topics in CS

- ▶ A special projects course that would allow students to focus on a specific area of computing
- ▶ Encompasses a broad range of specialized courses such as AP CS or courses intended to lead toward industry certification

Download your free copy of the ACM K–12 CS Model Curriculum at the CSTA website.

csta.acm.org/Curriculum/sub/ACMK12CSModel.html

Digital Portfolios

Leigh Ann Sudol, AP Computer Science Teacher

A digital portfolio is a process used to track students' progress over time or to document mastery of specific educational goals or standards. Although computer science has some unique needs when it comes to evaluating student progress, portfolios offer a sound educational strategy.

In addition to being a collection of work that represents the accomplishment of a series of goals or competencies, a digital portfolio contains reflections by the student about the learning demonstrated. Explanations of why a particular example was chosen as well as what its completion represents for the student are important parts of the metacognition involved in producing a digital portfolio.

Metacognition is thinking about one's thinking processes. Involving students in metacognition is a

unique challenge in a course that is built upon projects and problem-solving.

How do we get students to think about what they are doing - to deconstruct the

thought processes that result in successful algorithm implementations? Students often rely upon a trial-and-error approach to problem solving. They pursue this circular path of problem solving until they stumble upon the correct solution. Throughout this process, teachers struggle to guide students to think about how they are thinking about the problem and how to deconstruct a problem into its pieces.

Digital portfolios can create opportunities for students to think about their thinking and provide clear evidence of their learning. The question remains, however, as to how teachers can implement portfolios to complement rather than distract from a crowded curriculum. Techniques can be borrowed from fellow educators in other subject areas.

Scaffolding is the current practice of creating materials that provide incremental support for an educational task or activi-

ty. We can scaffold the digital portfolios for students by giving them specific questions that they need to address as they choose the examples of their work for inclusion in their portfolio. Questions could include: "How does this program demonstrate your accomplishment of the goal?" or "As you worked on this project, what methods did you use to arrive at a successful algorithm?" or "How could the thought processes that you applied to this program be applied to other assignments or projects either inside or outside of this classroom?" These questions will stimulate students to think about what and how they are learning.

Teachers can also model metacognition by creating their own portfolio to share with students. A teacher's portfolio might

The question remains, however, as to how teachers can implement portfolios to complement rather than distract from a crowded curriculum.

contain computer programs or other goals and professional challenges. By answering the same questions about their own thought processes, teachers can also demonstrate the value of analyzing one's own thinking and model effective learning strategies.

Digital portfolios can play an important role in the computer science classroom. Through the development of portfolios, students can track the progress of their learning toward defined goals and reflect upon their own intellectual processes as they plan and problem solve. These activities will contribute to their growth as more thoughtful computer science students. The more we encourage students to reflect upon their work and their programs, the more likely they will be to develop good habits and problem solving skills that will carry forward through the course, and into their future academic and professional pursuits.

Revising the Computing Curriculum in Georgia

Barbara Ericson, Dir. CS Outreach, Georgia Institute of Technology

In an effort to lead the nation in improving student achievement, the state of Georgia has announced new K–12 performance-based standards in several subjects, and its standards for Business and Computer Science will be based upon *ACM’s Model Curriculum for K–12 Computer Science*.

In 2004, Georgia began phasing in new standards in English/Language Arts, Math, Social Studies, and Science. An audit

Our goal in Georgia is to have a few standards that are well defined...

by Phi Delta Kappa found that the old standards lacked rigor, were an inadequate guide to teaching, did not follow national standards, and would take twenty-three years to cover all the content. Teachers had to guess what was important to teach. The new standards, however, detail what the students should know and be able to do. They include sample tasks, student work, and teacher commentary. The new standards should help prepare students for standardized tests and assist teachers in planning instruction.

The revisions for Business and Computer Science began with the modification of the courses in a track that leads to a career in computing/software engineering. A team of high school teachers and

university faculty was formed and met three times in 2005 and will meet one to two more times in 2006.

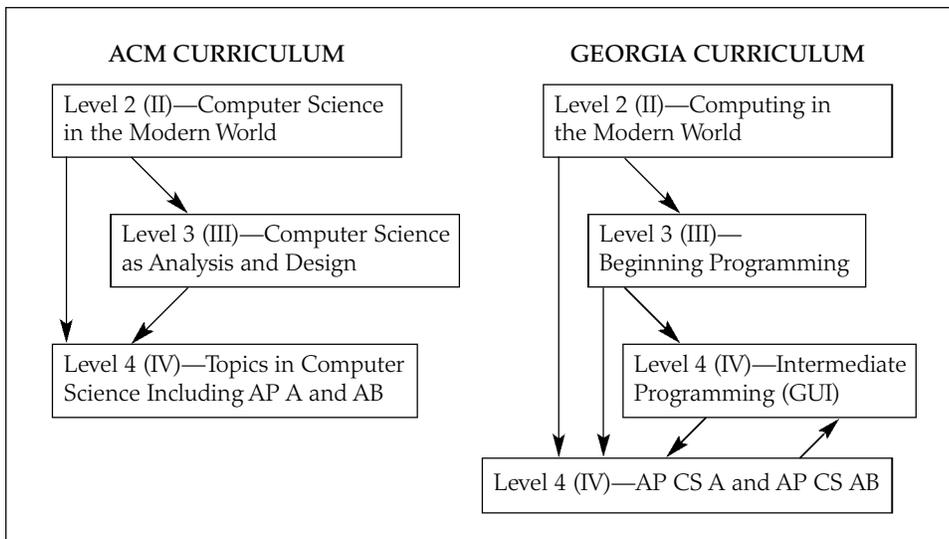
As the diagram of suggested courses shows, the new standards are closely mapped to the *ACM Model Curriculum for K–12 Computer Science* with the addition of an optional Intermediate Programming course before the Advanced Placement (AP) courses. This optional course will

focus on graphical user interface development.

Because it was designed to be a flexible and yet comprehensive

model, the ACM curriculum is content-based and broader than our current needs in Georgia. In addition, the *Outlines and Objectives* supplementary document for the Level II course adds four additional topics to the original ten topics in the ACM curriculum. Our goal in Georgia is to have a few standards that are well defined so that teachers will use them and not just teach the content of whatever book they are using. These standards form the minimum content and can be supplemented by additional material.

The final draft of the new standards will be submitted to the Board of Education in April. Teacher training will take place during the 2006-2007 school year and the standards will be fully implemented during the 2007-2008 school year.



Meet the Authors

Bob Allen,

Associate Professor, Drexel University
Bob was the Editor-in-Chief of the *ACM Transactions on Information Systems*, and was Chair of the ACM Publications Board. He has extensive research and professional experience on digital libraries and information retrieval and currently is developing a curriculum on the management of digital information and writing a comprehensive textbook: *Information Science and Systems*.

Charmaine Bentley, CS Educator

Charmaine has taught computer science at Roosevelt High School, Dallas ISD, for 18 years. She is an active member of TCEA, TACS SIG, and CSTA.

Barbara Ericson,

Director, Dir. CS Outreach, Georgia Institute of Technology
Barb has over 20 years experience in computing in both research and academia. She has taught undergraduate computing and continuing education courses for Georgia Tech and is on the committee to revise the Georgia Business/Information Technology curriculum.

Angie Klein, Assistant Professor, William Jewell College

Angie promotes computer science education to youth through Liberty Public School District, Girl Scouts, Boy Scouts, and local science clubs, in addition to her teaching of Information and Computer Science in Liberty, MO.

Chris Stephenson,

Executive Director, CSTA
Chris is part of the Teaching Leadership doctoral program at the Oregon State University’s College of Education.

Leigh Ann Sudol,

Fox Lane College
Leigh Ann has been teaching AP Computer Science for 9 years and is currently at Fox Lane HS in Bedford, NY. She is a College Board consultant and co-author of *Java Software Structures for AP Computer Science AB*. Leigh Ann spent a week in South Africa last summer at the World Conference on Computing in Education.

Classroom Tools

Student Competitions Build Skills

Charmaine C. Bentley, CSTA Membership Chair

Student computer science competitions are valuable activities for developing and showcasing technical skills, as well as communication, team work, and poise. Many student competitions are conducted each year. Here are a few:

MICROSOFT 2006 PROJECT HOSHIMI PROGRAMMING BATTLE

This competition, exclusively for U. S. high school students, brings together an imaginative background story, comic-style graphics and fun programming challenges, allowing students to compete online with students from all over the country. Students will devise strategies and write code to navigate a team of nanobots for life-saving missions and objectives through a map of the human body. This is a great opportunity for students to learn the basics of game programming while building their programming and problem-solving skills. Students compete to win great prizes including an Xbox 360! Visit www.mainfunction.com for more information.

AMERICAN COMPUTER SCIENCE LEAGUE

The American Computer Science League (ACSL) has organized computer science and programming contests for junior and senior high school students since 1978. Last year, during the 26th year of continuous operation, over 200 schools in the U. S., Canada, Japan, and Europe participated. ACSL is sponsored in part by ACM and is on the approved activities list of the National Association of Secondary School Principals (NASSP). Visit www.acsl.org/ for more information.

FIRST ROBOTICS

The FIRST Robotics Competition is a multinational competition that teams professionals and high school students to solve an engineering design problem. In 2006, the competition will reach over 28,000 high-school-aged young people on over 1,125 teams in 33 regional events. Teams come from Brazil, Canada, Ecuador, Israel, Mexico, the U. K., and almost every state in the U. S. Students compete with brainstorming, real-world teamwork, dedicated mentoring, project timelines, and deadlines. Visit www.usfirst.org/robotics/ for more information.

USA COMPUTING OLYMPIAD

The USA Computing Olympiad (USACO) is a pre-college computing organization in the United States. Its goals include: providing students with opportunities to expand their programming skills, enhancing computer science education by providing materials that emphasize problem solving, recognizing students with outstanding skills, and encouraging them to pursue computing careers.

The USACO holds six Internet contests during the school year and conducts the U. S. Open as a proctored exam in the spring. Students with the best scores are invited to the USA Invitational Computing Olympiad. Four selected participants represent the United States at the International Olympiad in Informatics (IOI), held annually. Visit <http://oldweb.uwp.edu/academic/mathematics/usaco/> for more information.

Readers are invited to refer other student computer science competitions for inclusion on the CSTA website. Please send information to CSTA at cstapubs@csta.acm.org

WHAT KEEPS STUDENTS OUT OF COMPUTER SCIENCE?

% reflects the number of teachers that indicated this was the main reason students did not take a CS course

No room in schedule/academic plan.....	43%
Subject matter too difficult.....	20%
Greater interest in other subjects.....	17%
Elective courses are less "important".....	14%
CS is perceived to be "geeky".....	4%
Not measurable "other" reasons: lack of courses and job market	

SOURCE: Analysis of high school survey data.

www.csta.acm.org/Research/sub/survey_pdfs/CSTASurveyResAnaly.pdf

Letters to the Editor

Certification Dilemmas Continue

Editor's note:

The following letter was received in response to the story "Certifiably Insane" by David M. Devine published in the December issue of the Voice. Mr. Devine's reply to the letter follows.

Dear Editor,

David M. Devine wrote an interesting story regarding certification in the State of Florida. I would like this information forwarded to him. Apparently, he was never told that a degree in any area of Business qualifies him for a Vocational Business Education Certificate. When you apply for this type of certificate and take the Business Education Test you are certified to teach Computer courses at the high school level. Additionally, when you enter the public school system you can receive up to 10 years credit on the salary scale for your occupational experience.

*Linda Zemon, Chairperson
Business Technology Department
Miami Sunset High School*

Mr. Devine's reply:

This response discusses qualifying to teach computer science by becoming certified in Vocational Business Education. This alternate method of qualifying to teach computer science seems to support how difficult it is to complete primary certification in computer science. In this instance, I would not qualify because my degree is in Engineering Computer Science and not Business. It would also require me to reapply for primary certification in Business in addition to at least taking the Business certification exam. This is a good deal of work and expense to ultimately bypass computer science certification.

The Business path to teaching computer science bypasses the Special Methods for Teaching Computer Science K-12 class required for primary computer science certification and the cause of my certification frustration. This seems to illustrate the insignificance of these classes, since they are not required for those choosing a different path to teach computer science.

This situation also points out other areas of concern when it comes to computer science certification. "Computer classes" generically get lumped in with Business classes. I know that I am

not qualified to teach accounting just as our accounting teachers could not teach computer science. The certification process, which should be designed to qualify computer science teachers, allows (and in Florida virtually forces) teachers to bypass the computer science certification process. Those familiar with the system can find easier ways to become certified, but are they best prepared to teach computer science?

David M. Devine

Membership News

Sun's Contribution to CSTA

Chris Stephenson, CSTA Executive Director

A CSTA Web repository that will house a wide variety of teaching and learning materials specifically geared towards computer science education is another step closer to reality, thanks to a generous donation of equipment from Sun Microsystems.

The Web repository was being built at Villanova University using a borrowed Sun server until Greg Papadopoulos, Sun Vice-President and member of the CSTA Advisory Council, offered his assistance.

Thanks to his generous offer, we now have a Sun Fire V210, 2 x 1.34Ghz UltraSPARC IIIi, 4 x 512MB DIMMS, 2 x 73GB Drive, 4 x 10/100/1000 Gigabit Ethernet, ALOM Remote Manager, Single PCI Slot, 1PSU & Java ES & Solaris 10 pre-installed.

This new server will allow us to make better progress on the new interface being designed by Villanova University students under the direction of Dr. Lillian Cassel.

The Web repository is being built using DSpace, a highly-customizable open source repository facility. The CSTA repository utilizes the standard Dublin core metadata so that the material it contains will be harvestable by other major repositories such as the National Science Data Library.

Thanks to this most generous donation from Sun, the CSTA Web repository is closer to being a reality than we expected. Our goal is to have it up and running and available to all CSTA members by the summer!

Committee News

Career Binder Added to Collection

Charmaine C. Bentley, Career Binder Task Force

One of the benefits of CSTA membership is Web access to the CSTA Virtual Binders. A new Careers binder joins the Equity and Teaching Strategies binders as part of the growing collection. Below is a summary description of a few of the 14 articles found in the Careers binder.

Continuing the theme presented in the Equity binder, *Women in computing: what brings them to it, what keeps them in it?* is a reprint of an article first printed in 1998. Derived from a study of 15 women, it presents reasons for choosing computing as a career and discusses the issues that deter some.

IT offshore outsourcing: impact on CS/IS curriculum addresses misperceptions and describes the problems associated with this current trend. *Impact of offshore outsourcing on CS/IS curricula* and *IT skills in a tough job market* provide additional data that educators in Computer Science will find valuable in discussions with students.

Computer workers: career lines and professional identity addresses traditional career concepts. Educators can use the *Career fields* article to help students understand the application

of computing knowledge to various fields. *Bioinformatics and computing curricula 2001: why computer science is well positioned in a post-genomic world* complements this concept of multidisciplinary career preparation.

Computing education and the information technology workforce highlights what the debate on outsourcing continues to hide - a continued shortage of well-trained computing professionals in critical areas. This theme continues in *Preparing the information technology workforce for the new millennium*.

Discussion of the Myers-Briggs personality measures adds value to the document for educators. This article does not disappoint.

This binder contains several more articles on various career related topics written from differing view points. All are informative and some will be especially useful in explaining to students, parents, and fellow educators why computer science continues to be a viable and important field of study.

Bits and Bytes

Pat Phillips

Cisco Systems and the National Center for Women & Information Technology launched a nationwide initiative to address the gender gap in IT. The initiative introduces a comprehensive digital library (www.ncwit.org/cisco) designed to give students, parents and educators the tools to learn more about careers in high-tech fields and the importance of girls' participation.

The initiative provides students, parents and educators with a variety of tips for encouraging young women to excel in math, computing, and technology, along with sample lesson plans for teaching computing to girls. The program website also houses a wealth of information for students about interesting careers in technology and details about local clubs, programs, and summer camps for girls in technology.

Cisco and NCWIT are working in collaboration with several industry organizations on the initiative, including the Educational Development Center, the Information Technology Association of America, the Stanford University Office of Science Outreach, and Junior Achievement.

Check out the Internet safety and ethics materials from the Business Software Alliance. The materials are complete lessons for classroom use.

- Play it Cybersafe (www.playitcybersafe.com) is designed primarily for elementary and middle school students.
- Define the Line (www.definetheline.com) is appropriate for high school and college students.

Packetville is an online learning community designed for young people ages 8-14, and their teachers, parents, and club advisors. The site features interactive video-type games, an assortment of activities, newsletters, web links, and educational materials to complement the games. Learning about the Internet (servers, routers, wireless communication, video streaming, MP3 files, viruses, hackers, security, interference, latency, satellites, etc.) is done through interactive stories that feature problem situations (students who have no access to education, scientists who need to send out valuable information, etc.) around the world. While playing the games and participating in the activities, students are introduced not only to the workings of the Internet, but also to careers in IT and engineering. They see how computers can be used to help others and how technology-related careers are good choices for both girls and boys.



We're on the Web! <http://csta.acm.org>

MARK YOUR CALENDAR

Florida Educational Technology Corporation (FETC) Conference

March 22–24 in Orlando, Florida
www.fetc.org/

The Central Plains Region of the Consortium for Computing Sciences in Colleges (CCSC:CP)

April 7–8 in Maryville, Missouri
www.ccsc.org/centralplains/

National Council of Teachers of Mathematics (NCTM) Conference

April 26–29 in St. Louis, Missouri
www.nctm.org/meetings/stlouis/

National Education Association (NEA) Conference

June 30–July 5 in Orlando, Florida
www.nea.org/annualmeeting/index.html

National Educational Computing Conference (NECC)

July 4–7 in San Diego, California
center.uoregon.edu/ISTE/NECC2006/

CSTA/ISTE Symposium for Secondary CS & IT Teachers

July 8 in San Diego, California
www.iste.org/profdev/symposia/cs/2006/

Advanced Placement National Conference

July 12–16 in Lake Buena Vista, Florida
www.collegeboard.com/apac/2006/index.html

Grace Hopper Celebration of Women in Computing 2006

October 3–7, 2006 in San Diego, California
www.gracehopper.org/



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- View CSTA Voice past issues online
- Access curriculum support documents
- Get a "csta.acm.org" email forwarding address
- Visit TechNews and CareerNews digests
- Access online virtual binders

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RESOURCES

Here's more information on topics covered in this issue of the CSTA Voice.

PROFESSIONAL DEVELOPMENT

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Page 1: NECC 2006 center.uoregon.edu/ISTE/NECC2006/

Page 1: ISTE www.iste.org/

Page 2: Computer and Information Science Forum www.cisforum.org

Page 3: CSTA Survey results csta.acm.org/Research/sub/CSTANationalSurvey2004.html

Page 3: CSTA Survey analysis www.csta.acm.org/Research/sub/survey_pdfs/CSTASurveyResAnaly.pdf

Page 4: Computer World www.computerworld.com

TEACHING RESOURCES

Page 4: An article on Digital Portfolios with an international perspective www.csubak.edu/~dgeorgi/projects/digital.htm

Page 4: Dr. Helen Barrett's links on alternative assessments and digital portfolios electronicportfolios.org/portfolios/bookmarks.html

Page 5: A Model Curriculum for K–12 Computer Science csta.acm.org/Curriculum/sub/ACMK12CSModel.html

Page 6: Project Hoshimi Programming Challenge www.mainfunction.com

Page 6: American Computer Science League (ACSL) www.acsl.org/

Page 6: FIRST Robotics Competition www.usfirst.org/

Page 6: USA Computing Olympiad oldweb.uwp.edu/academic/mathematics/usaco/

Page 7: CSTA Virtual Binders campus.acm.org/public/csta/binders/index.cfm

Page 7: National Center for Women & Information Technology www.ncwit.org

Page 7: Cisco Systems www.cisco.com

Page 7: Packetville cisco.com/go/packetville

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