Inside This Issue

IN THE NEXT ISSUE OF THE VOICE
—— Promoting CS

Summer Recharging

Robb Cutler, President, CSTA

Summer is a time when I decompress from a long school year, think about how to be a better educator, and recharge my batteries in preparation for September. This year, my rejuvenation occurred in San Diego during a conference, a symposium, a board meeting, and occasionally, beside the pool.

The conference was the National Educational Computing Conference (NECC). While NECC focuses mostly on K–12 instructional technology, there is a computer science (CS) strand. CSTA board members, Debbie Carter and Michelle Hutton, participated with presentations on CSTA's new Web Repository and Level 2 of the *ACM Model K–12 Computer Science Curriculum*.

The Computer Science & Information Technology (CS&IT) Symposium offered excellent professional development. Several attendees reported that it had been the best day of professional development they had ever had. The keynote speakers, Ellen Spertus and Kevin Schofield, were powerful and thought-provoking. The workshops on wikis and programming with .NET offered exciting,

hands-on learning. Sessions throughout the day, on such topics as CS equity issues by Jane Margolis, programming with *Alice* by Wanda Dann, and kinesthetic learning by Andy Begel, were just what I needed.

Finally, the CSTA board meeting was a perfect conclusion. I'd like to thank you, the membership, for electing three very dynamic and inspiring individuals to the CSTA Board. It is clear that Steve Cooper, Barb Ericson, and Leigh Ann Sudol will make substantial, positive contributions to the work of CSTA. The outstanding efforts of the CSTA Board and of all of the other people dedicating their time and energies to CSTA and to CS education, enable CSTA to provide you with resources such as the Web Repository, the *Voice*, curriculum materials, professional development opportunities, and most importantly, a large, unified K–12 CS community.

So after a week in San Diego, I am energized and ready for students again!

Mark your calendar now for next year's NECC (June 24–27) and CS&IT Symposium (June 28) in Atlanta.

New Classroom Poster Makes Connections

Three industry giants have pitched in to help as CSTA kicks off a major campaign to make students aware of the variety of career opportunities available in computing.

Responding to the need to encourage students to consider careers in computing

and information technology CSTA, ACM-Women, and the American School Counselors Association worked with designer Beth Scandalios to create a colorful 2x3 classroom poster.

The poster was designed to help stu-

csta Voice

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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.

NEW CLASSROOM POSTER
continued

dents make the connections between computing and the broad array of careers and sciences that depend upon technology for progress and innovation.

"Few students realize that fields such as health care, environmental protection, space exploration, and communications all depend upon skilled computer scientists," says Michelle Hutton, CSTA's Equity Chair. "We wanted to help them see that computing is about solving real-world problems, not about sitting in a cubicle pounding out code."

Intel, Microsoft, and Sun (all of whom are represented on CSTA's Advisory Council) provided funding for the printing of the poster.

The poster is being distributed via national and local educational conferences and to CSTA members. It is also available for download from CSTA at *csta.acm.org/Careers/Careers.html*.

Symposium Focuses on Engaging All Students

Kate Conley, Periodicals Director, ISTE

If you are a computer science (CS) educator, or even if you aren't, it's hard to go wrong when your day begins by listening to the Sexiest Geek Alive. Dr. Ellen Spertus (associate professor at Mills College and part-time software engineer at Google) kicked off the 7th Computer Science & Information Technology (CS&IT) Symposium in style—geek style, that is.

She described how teachers could generate more interest for CS among their students by using an interdisciplinary approach to teaching. "Professors can no longer act as if computer science is the center of the universe," said Spertus. In an effort to generate more interest for CS classes among her female student body, Spertus has renamed traditional CS classes with monikers such as "Robots, Persons, and the Future." She equates programming to performing magic, writing spells, and transfiguration, à la Harry Potter, to spark student interest.

More than 125 CS and IT educators heard Dr. Spertus's remarks when they gathered in San Diego, California, on July 8, 2006, for the CS&IT Symposium. Attendees came from across the United States, Canada, and from as far away as Zimbabwe. Co-hosted by CSTA and the International Society for Technology in Education (ISTE), the annual symposium provided a full day of high-quality professional development for teachers, technology specialists, and administrators.

Spertus's encouragement to "market" CS classes differently to students was echoed throughout the symposium

program. In Andy Begel's (Microsoft Research) session on using kinesthetic learning activities to teach CS concepts, attendees used real objects, such as balls, silly hats, and leis to teach lessons on hash functions and the difference between classes and objects. Participants actively

> …teaching CS is about more than teaching to a test; it's about teaching problem-solving, logic, and critical thinking skills that can help students succeed…

contributed to the lesson planning discussion with equal amounts of humor and thoughtful engagement.

In her session on increasing participation of minorities and girls in high school CS, Jane Margolis, a social scientist at UCLA, and her audience agreed that teaching CS is about more than teaching to a test; it's about teaching problem-solving, logic, and critical thinking skills that can help students succeed, not just in any number of careers, but in life as well.

Presenter Wanda Dann (CS professor, Ithaca College) put it nicely when she said, "If you can read a word problem and come up with a step-by-step process for solving that problem, it will make you a better doctor, or nurse, or mom, for heaven's sake! Fundamental problem solving is a good thing."

Carol Kinnard, a teacher at Livermore High School in California, said, "I wish I could clone myself, so I could go to all the sessions. I'm so charged that I want to start three new classes!" The program had a total of 19 sessions, more than in previous years, on topics including wikis, Flash programming, games, simulations, 3D animation, and equity issues.

Microsoft has generously funded the symposium for five years. When asked why they support the symposium, Kevin Schofield (Microsoft Research) said, "Because it's the right thing to do, not just to promote IT workers, but to advance the field. A rising tide raises all ships."

The CS&IT Symposium created a surging tide, one of enthusiastic teachers trying to find better ways to teach their students. For more details on the symposium and to download presenter handouts, visit *www.iste.org/profdev/symposia/cs/2006/*.

A New Web Repository of K–12 CS Teaching Resources

Debbie Carter, CSTA Board and College Board Consultant

"My students spend a lot of time on the Internet, but they have no clue how to find useful information."

"How can I help my students understand objects?"

"Artificial Intelligence is a great topic; I've found some great Web sites that help my students understand how AI can be used."

"How can I get more girls in my computer science (CS) courses?"

"My array projects are old and tired; where can I find some new ideas?"

"I've heard about a teacher who has some great project ideas on her Web site, but I can't remember her name."

How many times have you wished that you had better access to CS teaching resources? Well, you're in luck! To promote sharing among members of the community, CSTA has developed a searchable database of instructional materials, lesson plans, and other resources that have never before been collected in one place for use by all CS teachers.

A little bit of history: In December of 2002, the year before the AP CS curriculum would be shifting from C++ to Java, the ACM K–12 Education Task Force and The

NEW NATIONAL WEB REPOSITORY
continued

College Board recognized the need for professional development for current CS teachers, and they proposed two joint initiatives: Java Engagement for Teacher Training (JETT) workshops and a Web repository for K–12 CS teaching resources. Since that time, dozens of JETT workshops have been presented by universities, and workshop materials have been collected with the hope that a repository would be created to house them.

Recognizing the need for resources, the team also proposed the development of a new Web Repository. The College Board and CSTA then funded the planning and development, and Sun Microsystems provided the server hardware. The Web Repository, based on DSpace (open-source digital repository system software), was then customized by Villanova students with faculty supervision from Lillian Cassel.

The CSTA Web Repository, still in its infancy, was been seeded with materials from JETT workshops, but it also includes resources from Teacher Enrichment in Computer Science (TECS) workshops, the new series for teachers of introductory CS courses. The resources have been grouped into four curriculum levels, with multiple topics within each one, based on the *ACM Model Curriculum for K–12 Computer Science*, and the *AP CS Course Description*. There is also a collection called "Strategies for Implementation," with ideas that span curriculum levels: clubs, equity considerations, and promoting CS. CSTA volunteers have

classified and entered these materials into the repository, and there are now over 50 resources of various types: multimedia presentations, lesson plans, assignments (both lab and written), papers, and source code.

These resources are available for download by all CSTA members. To access the repository, visit the CSTA Web site (*csta.acm.org*), and click on the Web Repository link. You may browse by curriculum classification or search by title, author,

> ...the repository will be most useful when many teachers have contributed their own resources.

keyword, or publication date. You may download any resources that interest you.

But this is just the beginning; the repository will be most useful when many teachers have contributed their own resources. Submitters fill in a form with information about their resources, and then they upload them to the repository. They retain the copyright on their materials, while giving CSTA the rights to allow distribution to other members.

The CSTA Web Repository page provides guidelines for classifying and submitting your resources, as well as an optional template for organizing the information before you enter it online. All submissions will be reviewed by a small team of educators before appearing in the repository.

Which will you do first: look in the Web Repository for resources or prepare some of your own for submission? We are eager for you to do both.

TECH CORPS Creates Tech-savvy Students

Lisa M. Chambers, State Director, TECH CORPS

TECH CORPS Ohio is one of a dozen or more state TECH CORPS chapters that are helping schools and youth-serving organizations to make technology an integral part of the educational process.

According to a 2002 National School Boards Association survey, 53% of school leaders report that students are providing technical support in their districts. This tech support is largely ad hoc and most

students get no formal training.

To address this issue, TECH CORPS developed Student TECH CORPS, a program that delivers core technology training to middle and high school students who use their knowledge to operate a Student-Run Help Desk. The program is comprised of three components: basic technology curriculum, testing and certification, and a Student-Run Help Desk includ-

ing all procedures, training, and call tracking software required to successfully implement a student-run help desk to support the school's technology infrastructure.

Since 1999, TECH CORPS Ohio has recruited, placed, and supported more than 320 tech-savvy volunteers in 250 schools in 11 Ohio counties, providing more than 12,000 hours of service.

This year, more than 100 students from 15 schools in Ohio are participating in Student TECH CORPS. Students meet once a week for three hours after school and use the Student TECH CORPS curriculum to learn comprehensive information technology and soft skills to enrich their learning and prepare them for future employment in the field of technology. In addition, they receive $7 per hour while in training. All students who demonstrate an 80% or higher mastery on the certification exam receive a $250 bonus and assistance with finding a summer job experience where they can apply their skills.

TECH CORPS Ohio has also developed Girl TECH CORPS, a program for girls in grades 3 to 5 that provides access to computers and basic computer training as well as the opportunity to develop relationships with tech-savvy professional females from the community.

TECH CORPS Ohio offers its programs at no cost to schools. The organization is supported by corporate and foundation contributions. For more information on programs in your area, visit *www.techcorps.org*.

Pair Programming Video

Linda Werner, Ph.D., Jill Denner, Ph.D.

Researchers working on an NSF-sponsored project to help middle school girls develop information fluency by teaching game construction have developed a new video to help teachers incorporate pair programming into their teaching strategies.

Pair programming is an aspect of extreme programming (XP) and requires that teams of two programmers work collaboratively to design, code, and test software. The two partners work at a single computer where one is designated as the "driver" and controls the keyboard and mouse. The other partner is the "navigator" and is responsible for continuously reviewing the keyed data to identify defects as they occur. After a designated period of time, the roles are reversed. Code created when only one partner is present is either discarded or reviewed by both partners before it is integrated into the whole.

Because sharing one computer does not come naturally to most students, researchers Linda Werner and Jill Denner developed materials and activities to support students in working more effectively as a pair. The *Examples of Pair Programming* video is an instructional tool for educators who want to use pair programming in their classes or programs. The 12-minute video contains role-plays of good and bad pair programming and offers questions to guide group discussion about how to work together at the computer most effectively. The intended audiences for this videos are middle and high school age students and their teachers in computer science (CS) and information technology classes.

Werner and Denner note that pair programming's use in university-level introductory computer programming courses has been studied and found to be an effective tool for increasing the retention of both female and male university students in CS and related majors. Research results show that pair programming students report greater confidence in their solutions and report greater satisfaction with the problem-solving process than do their non-paired peers. Additionally, paired teams' programs have higher quality in terms of functionality and readability and paired teams are more likely to complete a programming assignment. Even though improvements exist for both females and males, the use of pair programming has led to a reduction in the "confidence gap" between female and male students.

The video is available for download free of charge at *www.soe.ucsc.edu/~charlie/projects/pairprogramming/video*.

Meet the Authors

Lisa M. Chambers
State Director of TECH CORPS of Ohio
Lisa was named a 2006 "Modern-day Technology Leader" by *US Black Engineer & Information Technology* magazine.

Kate Conley
Periodicals Director at ISTE
Kate is the editor of *Learning & Leading with Technology* (*www.iste.org/LL*).

Jill Denner
Research Associate with Education, Training, Research (ETR) Associates in Scotts Valley, CA
Jill is interested in the research of engaging girls with IT and the role of gender and culture in Latino youth.

Peter B. Henderson
Professor of CS and software engineering at Butler University, IN
Peter is the editor of "Math Counts" in ACM SIGCSE *Inroads*.

John Impagliazzo
Professor of Computer Science at Hofstra University, NY
John is chair of the International Federation for Information Processing Working Group 9.7 on the History of Computing.

Bria McElroy
Director of University Initiatives for the Center for Women and Information Technology at the University of Maryland, Baltimore County
Bria leads initiatives to attract more women into technology and engineering.

Claudia Morrell
Executive Director of the Center for Women and Information Technology at the University of Maryland, Baltimore County
Claudia directs programs to ensure women's participation in science, technology, engineering, and mathematics.

Linda Werner
Lecturer in CS at the University of California, Santa Cruz
Linda's research includes pair programming, software engineering, CS education, and gender equity.

Advocating for CS Education

CSTA Focuses on Building Partnerships

CSTA is working hard to inform the public and policy makers about issues on the minds of computer science (CS) educators as part of its comprehensive advocacy strategy.

Since June 2005, CSTA Executive Director Chris Stephenson and President Robb Cutler have been meeting with policy-makers and members of the press to inform them about CSTA and the issues and challenges facing CS education today. These include meeting with reporters from CNN, the Associated Press, Education Daily, the Washington Post, US News & World Report, The Chronicle of Higher Education, CIO Magazine, and InfoWeek.

Stephenson has also been meeting with leaders of organizations who share CSTA's concerns about ensuring that all students have the opportunity to develop the 21st century knowledge and skills they need to thrive in our increasingly global economy. These organizations include the U.S. Department of Education, the U.S. Chamber of Commerce, The National Academies, the Business Roundtable, the Business Software Alliance, the American School Counselors Association, and Girls Inc.

Cutler, notes that this outreach is essential to building key partnerships and strategies for improving the public's understanding of the importance of computing education. "Working with groups who share our goals is a key element of CSTA's advocacy strategy," he said. "We have everything to gain by helping everyone understand our discipline and its importance to education, innovation and our economy."

From our Members

It's Time to Make Discrete Math More Accessible
John Impagliazzo

It's time! It's time to offer discrete mathematics (DM) as a computing-related course in high schools. I believe it will foster greater accessibility to, and acceptability of, computing programs and careers.

Throughout the years, various groups have promoted computer science (CS) curricula for high schools that included recommendations from a spectrum of topics—the breadth of computing. For a variety of reasons, the current study of CS in many high schools focuses on programming. School districts face challenges with limited resources, lack of defined teacher certification, and legislation such as *No Child Left Behind* that tend to marginalize CS as a discipline. To complicate the issue, Advanced Placement (AP) Computer Science, which is predominately a programming course, has become the central CS activity in many schools.

In my opinion, to equate CS with programming is a big mistake. Most often, practitioners of CS and related fields do much more than programming; they often direct their efforts to design, problem solving, and project management. Furthermore, the high school perception of a programmer is some kind of "nerd" who spends endless hours in front of a computer. This portrayal is not the "hero" image sought by many high school students, and as a result, these students shy away from CS and programming courses and ultimately, CS careers.

Offering a computing-related course in DM would be an effective strategy to promote CS and to build a more sustainable computing program within a high school. I believe this because:
- DM is important and useful for all areas of computing,
- DM content is directed to all computing topics, not just programming,
- a DM course would be accessible and valuable to all high school students, not just those interested in computing fields,
- a course in DM would complement existing computing courses,
- certified high school mathematics teachers are already qualified to teach discrete (finite) mathematics, and
- students may be encouraged to study computing after high school.

With enrollment in CS suffering at most universities, if not most high schools, now seems to be the perfect time to consider seriously the development of a one-year computer-oriented DM course that should develop into an AP offering.

Some educators may worry that enrollment in CS courses would suffer if DM were also available. I contend not. The exposure of computing topics within the DM context would likely encourage students to further explore computing through other CS courses.

As computing educators, we owe our students and the computing profession serious consideration of offering a computer-related DM course in high schools. We cannot afford to neglect complementary avenues of study, especially since computing is much broader than programming. Capturing the interest of students in high school through an accessible DM experience may very well be the way to revitalize CS education in secondary schools.

Spotlight

Computer Science Unplugged
Peter B. Henderson

Dr. Tim Bell, noted developer of the Computer Science Unplugged project for educating K–12 students about computing, will embark on an "Unplugged U.S. Traveling Road Show" through the Northeast and Midwest from mid-September to early October, 2006. The Unplugged project provides teachers with a series of off-line activities designed to allow students of all ages to explore interesting ideas in computer science (CS) without having to use a computer.

Dr. Bell's Unplugged Road Show will consist of shows for children, plus workshops and seminars for educators. The children's show engages kids and the young-at-heart with great ideas in CS using low-tech games, magic tricks, and stories. No computers are used as they learn about the Binary Birthday Cake or the Parity Memory Trick.

The workshops focus on enrichment material to explore CS and the seminars describe activities to demonstrate principles of CS to children in various settings or as warm-up activities for university courses. Lessons for using the project materials in school outreach programs will be presented and best practices highlighted.

Dr. Bell received the Science Communicator Award from the New Zealand Association of Scientists in 1999, and an inaugural New Zealand Tertiary Teaching Excellence Award in 2002. He has appeared with his Computer Science Unplugged show at the Edinburgh International Science Festival, the Dunedin International Science Festival, and the Australian Science Festival.

For a detailed schedule of Unplugged events and resources, please visit *www.cosc.canterbury.ac.nz/tim.bell/tour2006/tour.html* or contact Peter B. Henderson, *phenders@butler.edu*, for further information.

SHOW ME THE NUMBERS

"We're seeing just explosive growth in everything" in the technology sector, said Chad Macy, a high-tech recruiter in Austin, Texas, with staffing company Spherion Corp. "It's an amazing time to be a tech worker."
www.ajc.com/business/content/business/stories/0714techjobs.html

COMPUTER AND MATHEMATICAL OCCUPATIONS

Year	Employment	Mean Hourly	Mean Annual
1999	2,620,080	$26.41	$54,930
2005	2,952,740	$32.26	$67,100

EDITOR'S NOTE Technology careers within other disciplines are not included in these numbers. Compare the specific technology and CS career areas at *www.bls.gov/oes/1999/oes_15Co.htm* (1999) and *www.bls.gov/oes/current/oes_nat.htm#b15-0000* (2005).

Bits and Bytes

Why choose to study computer science (CS) & engineering? What takes place during the typical day of a computing professional? Students will connect with the first-hand advice and experiences of students and alumni offered in two new videos from the University of Washington Computer Science and Engineering Department.

A Day in the Life video describes the lives of recent graduates in several 2-minute profiles. Your students will see and hear from bright CS and engineering majors in highly-collaborative, creative, diverse, challenging, and well-compensated positions that provide fun lifestyles.

The Power to Change the World presents interview clips with several University of Washington Computer Science and Engineering students, alumni, and faculty explaining why they chose CS as their field of study. Your students will meet diverse, energetic, dedicated, and excited role models who know there is a world of opportunities in computing. You can access the videos from CSTA at *csta.acm.org/Careers/Careers.html* or directly from the University of Washington at *www.cs.washington.edu/WhyCSE*.

Out and About the Community

Computer Mania Day

Bria McElroy, Director of University Initiatives, CWIT
Claudia Morrell, Executive Director, CWIT

The Center for Women and Information Technology (CWIT) re-established Computer Mania Day to provide technology-related activities geared for middle school girls, their parents, teachers, and community members that will help everyone see that computing is cool and fun.

Computer Mania Day is designed to offer a broad-based introduction to career paths available to students with a strong knowledge of information technology (IT). This year's annual event in Howard County, MD, addressed the under-enrollment of girls in elective IT courses.

Fashion designer to the stars, Cynthia Rowley, kicked off the event by welcoming students and showcasing applications of technology to clothing design. Then, nearly 800 students gathered in small groups and rotated between 20 hands-on IT workshops and a fun presentation developed by Lockheed Martin Corporation highlighting the importance of technology in every career area.

Nearly 300 adults participated in a parallel program that provided information on the causes of girls' low enrollment in technology courses and tips on what parents, teachers, and community members can do to encourage girls to embrace technology and explore careers that focus on design and development.

More than 200 volunteers representing University of Maryland, Baltimore County (UMBC) students, area high school students, teachers, and business and community members lent their support.

CWIT has also received funding to create a replication book so that other organizations can bring Computer Mania Day to their own communities and to distribute the book nationally. For more information on the book, contact Claudia Morrell at *cmorrell@umbc.edu*.

CWIT, which was established at UMBC in July 1998, works toward women's full participation in IT.

Classroom Tools

Florida Girls Get IT

Nearly 75% of future jobs in the United States will require the use of technology, yet fewer than 33% of students in computer courses are female and women comprise only 20% of information technology (IT) professionals. These statistics prompted the development of Florida's Girls Get IT initiative.

Girls Get IT is a partnership between Cisco Systems, Inc., the Florida Community College System, and the Florida Distance Learning Consortium to achieve gender equity in the areas of IT and science, technology, engineering, and mathematics (STEM).

The partnership is providing:
• access for girls throughout Florida to participate in fun and educational activities related to technology, science, and math,
• innovation in the form of new strategies and tools for teachers and students to discover the ever changing world of technology,
• collaboration among education, community, and business organizations to develop best practices and information sharing capabilities, and
• opportunities for young women to explore careers in IT and STEM through mentors, internships, and pathways into the workforce.

The Web site (*www.flgirlsgetit.org/index.cfm*) offers resources for both teachers and students. Teachers will value the long list of resources for professional growth and classroom use, as well as numerous articles and research documents addressing equity issues. Downloadable activity sets and videos complete the collection.

The resources for girls are extensive. They will find links to sites specializing in mentoring, information on careers in technology, professional organizations, the history of women in computing, supporting networks, and e-zines especially for young women interested in technology.

There is also a special section for parents offering resources and tips on how to encourage and create confidence in girls, role models for girls, a sample of programs, and facts about women and work.

MARK YOUR CALENDAR

Computer Science Unplugged Road Show
September 15–October 4
For itinerary see *www.unplugged.canterbury.ac.nz/tim.bell/tour2006/tour.html*

International Conference on Interactive Computer Aided Learning (ICL)
September 27–29 in Villach, Austria
www.icl-conference.org/index.htm

Consortium for Computing Sciences in College: Midwest Region (CCSC:MW)
September 28–29 in Greencastle, Indiana
www.ccsc.org/midwest/Conference/
CSTA session:
    CSTA President, Robb Cutler, will be a keynote speaker.

Grace Hopper Celebration of Women in Computing 2006
October 3–7 in San Diego, California
www.gracehopper.org/
CSTA sessions:
    Practical Solutions for Addressing K–12 CS Equity Issues
    Priming the Pipeline: Girls Speak About Pre-college CS

Computers and Advanced Technology in Education (IASTED)
October 4–6 in Lima, Peru
www.iasted.org/conferences/2006/peru/cate.htm

Special Interest Group for Information Technology Education (SIGITE)
October 19–21 in Minneapolis, Minnesota
www.sigite.org/content/events/sigite06

ACM SIGPLAN International Conference on Object-Oriented Programming Systems, Languages and Applications (OOPSLA 2006)
October 22–26 in Portland, Oregon
www.oopsla.org/2006/

Frontiers in Education Conference (FIE)
October 28-31 in San Diego, California
fie.engrng.pitt.edu/fie2006/

ACM Special Interest Group for Computers and Accessibility (SIGACCESS)
October 23–25 in Portland, OR
www.acm.org/sigaccess/assets06/

Informatics in Secondary School – Evolution and Perspectives (ISSEP)
November 7–11 Vilnius, Lithuania
ims.mii.lt/issep/

Informatics Education Europe (ACM)
November 9–10, 2006 in Montpellier, France
www.ics.heacademy.ac.uk/education_europe/

Celebrate Computer Science Education Day
December 8, 2006
sws.lhps.org/computerscienceed

Visit the complete ACM Calendar of Events at: *campus.acm.org/calendar/*

RESOURCES

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

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Page 4: Tech Corps *www.techcorps.org*
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    www.soe.ucsc.edu/~charlie/projects/pairprogramming/video
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Presenter Materials

CS&IT Symposium 2006

Download today!

www.iste.org/profdev/symposia/cs/2006/