International CSTA

csta Voice

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

Volume 10, Issue 6 January 2015

## Inside This Issue



IN THE NEXT
*VOICE*

Professional Development

# print [Hello, World!]

Mina Theofilatou

print [Hello, World!] is probably the most recognized computer program, spanning all ages, countries, cultures, and programming languages. And I can't think of a better way to extend a warm welcome to CSTA's international members in this issue of the Voice than by just saying "Hello, World!"

My name is Mina Theofilatou and I am a middle and high school computer science (CS) teacher from the island of Kefalonia, Greece. I have served as the International Representative on CSTA Board of Directors since May 2014. CS educators around the world share in challenges and celebrate the excitement of CS education…and CSTA is a big part of our stories. I look forward to representing the interests of our international members on the Board.

I expect most of you will have heard about the financial crisis in my country and its impact on the Greek population. You may be surprised to learn that last year the Greek Ministry of Education decided to eliminate a popular high school programming class. CS teachers in Greece launched a campaign to reverse the decision. I am happy to announce our efforts and international attention played a significant role in reversing the decision. By an act of Parliament, the class will be re-introduced in September, 2015.

My story illustrates that getting involved can make a difference. I invite you to get involved in CSTA. Do you have a story to tell about CS education in your corner of the world? We'd love to hear it! Do you have an interesting lesson plan or teaching strategy? We'd love to it share with the world!

So, Hello, World! We're looking forward to hearing from you. Talk to us at *cstapubs@csta.acm.org.*

# Results from the CSTA-Oracle Academy 2014 U.S. High School Computer Science Survey

*The State of Computer Science in U.S. High Schools: an Administrator's Perspective*

ORACLE ACADEMY

csta csta.acm.org Computer Science Teachers Association

As we usher in the New Year, we have much to celebrate: interest in computer science (CS) education has reached an unprecedented high. Last month, an estimated 64 million students, teachers, administrators, parents, and community members across the globe participated in Computer Science Education Week (CSEdWeek), an annual event committed to ramping up engagement in programming, app development and design, robotics, networking, and other computational thinking skills and activities. Yet despite the recent frenzy

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csta Voice

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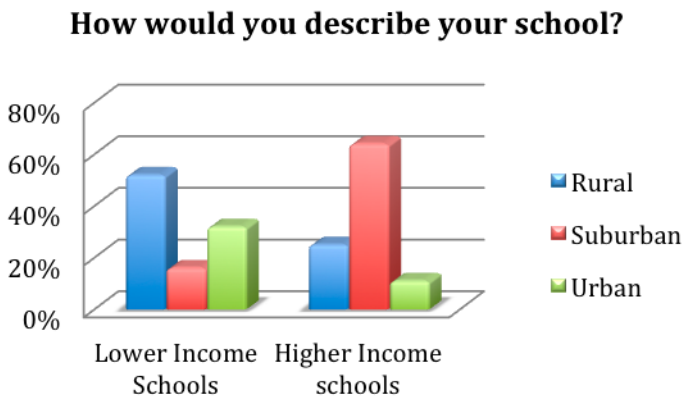
## THE CSTA-ORACLE ACADEMY 2014 U.S. HIGH SCHOOL CS SURVEY

*continued from page 1*

of activity surrounding CS and its relevance among the constellation of core disciplines, there remains a notable lack of accurate and generally available information about the state of CS education in U.S. high schools. Much of the existing research fails in multiple ways. It fails to clarify the relevance of CS education today and the importance of aligning it to core curriculum, and it fails to illuminate issues of access and the true state of CS education in U.S. high schools.

Interest in CS will continue to rise, and along with it a considerable need for data to help inform educators, policy makers, and others about the efficacy of U.S. CS education. In this spirit, the Computer Science Teachers Association (CSTA), in collaboration with Oracle Academy, administered an online survey to over 20,000 public and private 9–12 secondary school principals and vice-principals in the U.S. between May and September of 2014. The purpose of the survey was to identify CS education opportunities that are being provided at the high school level, determine how broadly CS is being offered in the U.S., and determine the different ways CS was being defined in the schools. Surveys were also sent to administrators across the U.S. using contact information provided by a market data company. A total of 503 people responded to the survey.[1] Schools from 47 states participated (no responses were received from Hawai'i, Vermont, or Wyoming). Administrators from California submitted the most responses (35), followed by Pennsylvania (34), and New York (31). Most of the responding schools support between 250 and 2,000 students, as shown in the accompanying chart.

[1] According to Meeting Professionals International (MPI) and Raosoft, Inc., this is a statically representative sampling size.




**CSTA Voice ISSN: 1555-2128**

**CSTA Voice** is a publication of the Computer Science Teachers Association.

**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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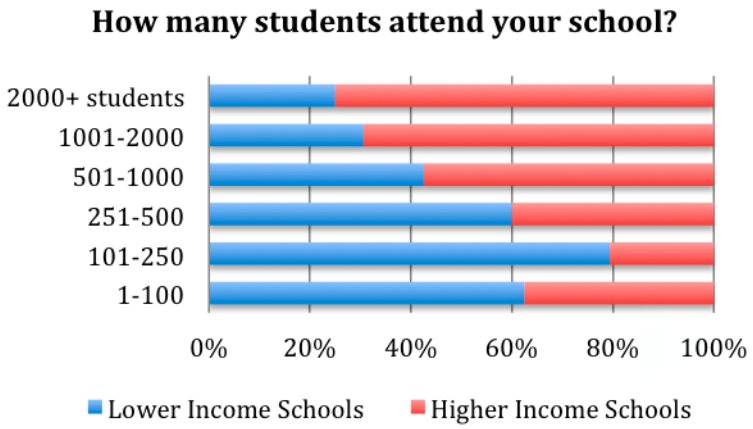


The survey results show that among the schools' academic departments, Career & Technology and Business emerged as those chiefly responsible for teaching CS. Of the 73% of respondents whose schools offer CS, an overwhelming majority counts these credits as requirements for graduation. However, only 39% of those schools count a CS class towards a requirement in math, science, or technology. This means that schools are more likely to count CS courses as electives. Where this becomes problematic for CS is that electives are often culturally and academically regarded as filler classes in a student's schedule. Student resources, such as College Board's BigFuture™, advise students to maintain course load balance by selecting easier electives: "Handling four or five core courses each semester doesn't leave a lot of room for extras. Some schools offer electives … that complement your extracurricular activities. Classes like these can reduce your after-school time commitment, giving you more time to study."[2]

The question of why students choose to fill their elective credits with fewer academically rigorous classes is likely answered by a combination of reasons. Chiefly, easier classes help to maintain course load balance, less demanding classes may secure or inflate GPA, and there appears to be a general cultural assumption that electives are primarily for fun. Classes that demand high degrees of problem solving, computational thinking, analysis, and mental rigor are associated with the core disciplines. Two possible approaches are to change the culture of how we regard electives, and/or designate CS as a core requirement. Yet, if we do nothing, we will continue to graduate students who are unequipped to navigate the demands of a 21st century workplace.

Administrators were asked specifically about the content covered in core academic CS classes as opposed to career technical education (CTE) courses. To these questions, several participants submitted "other" responses such as "I don't know," "can't remember what was covered," "not sure," and "what is CTE?" This is important because, frequently, CS courses are entered into CTE tracks for Perkins Funding, because they are classified as having a vocational slant, or because the skills acquired in CS classes can prepare a student for postsecondary success without pursuing a college degree. From the data, we conclude that at school administrative levels, there is a potentially problematic lack of knowledge of the elements of curriculum being billed as "computer science."

In addition, participants applied the term "computer science" to a vast array of topics and courses, many of which were submitted as "other" courses in response to the topics that were provided in the survey. Participants classified studies in business management, yearbook layout, artificial intelligence, robotics, office applications, and automated design as CS courses. This broad use of "computer science" to encompass curriculum and courses that would not be considered "computer science" at a college/university or professional level indicates a need for educational community consensus on a common definition of CS education and curricular content, lest we lead students or teachers to believe they are preparing students for college and careers when, in fact, they are not. This perhaps begs the question whether "computer science" as a designation is being applied inappropriately for funding or other reasons.

[2] "How to Choose High School Electives."

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# CSTA BOARD OF DIRECTORS ELECTIONS

## CALL FOR APPLICATIONS/ NOMINATIONS

K–8 Representative

K–12 Representative

At-Large Representative

Term of Service
June 2015–2017

Nominations due
February 1, 2015

*www.csta.acm.org/About/sub/AboutFiles/2015Election.html*

## THE CSTA-ORACLE ACADEMY 2014 U.S. HIGH SCHOOL CS SURVEY

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Administrators stated that the most prevalent CS course offered was web design and development, followed by intro to computer science. Overall 54% of the schools offered a CS course in grade 9, 47% offering it in grade 10, 39% offering it in grade 11, 37% offering it in grade 12, and only 27% offering at least one intro to CS course all four years. These were followed by computer graphics and programming. The top four content areas covered in CS courses were listed as problem solving at 65%, ethical and social issues and graphics tied at 57%, and web development at 51%. However, analysis of algorithms came in at 35%, as did testing and debugging. Each of these content areas is core to CS, and in particular, programming.

One of the most important findings from the study suggests that better-funded schools are offering CS to their students at a far higher rate than low-income schools. This research verifies what was only previously suspected. Of the 27% of schools where the majority of students qualify for free or reduced lunch, 63% offer CS courses. Of the 44% of schools where the majority of students do not qualify for free lunch, 84% offer CS courses.

For all schools surveyed, regardless of income status, data showed a strong correlation between those who teach CS during the regular school day and those who offer after-school programs in CS:

• Of the lower income schools that don't offer CS courses, fewer than 11% offer an after-school program in CS, compared to 40% of schools that teach CS.

• Of the higher income schools, only 16% of schools not offering CS courses provided after-school or extracurricular programs in CS, whereas an overwhelming 99% offered an after-school or extracurricular program in CS if the school offered CS courses.

This means that in lower-income schools, 37% percent offer no CS whatsoever, versus only 16% percent in higher-income schools. Developing a computer scientist requires a multi-year pathway to develop CS-related skills. The fact that students in lower-income schools have little to no access to CS over the course of their high school careers puts them at a disadvantage for both future college and career pursuits, and this has potentially far-reaching social and economic consequences for broader American society.

The survey data illuminate several key conclusions:

• Despite recent attempts to educate the community and expose more students to CS, there is still a huge misunderstanding of what CS is and what it isn't. This is important because without consistency in class offerings and a common understanding of CS in K–12, universities will continue to resist adding CS courses as accepted math or science credits for admission. Also, we will have fewer qualified educators teaching CS, and students who enter college will be woefully behind compared to schools that do offer a true-to-the-definition and comprehensive CS curriculum.[3]

• A related issue is that qualified CS teachers will not be hired to teach, a problem that is not likely to be alleviated without clear agreement about what is and is not a CS course requiring a certified CS teacher. CS teacher certification across the nation is typified by confounding processes and illogical procedures that keep it from functioning as intended. CSTA's report, *Bugs in the System: Computer Science Teacher Education in the U.S.*, aims to determine the nature of CS teacher certification in the U.S. and details the results for each state and the District of Columbia.

• Despite a concentrated effort by the CS community and its supporters, CS continues to remain an elective, and more schools do not count it towards a graduation requirement than do. This is important because without it counting, fewer resources and funding will be allocated to help implement CS programs. It is also important because electives don't count toward college admittance.

• There is a potential misperception that simply exposing students to technology as a tool or offering an hour of programming experience is equivalent to offering them the true CS education pathways that are needed to make students college and career ready.

[3] CSTA's definition of CS may be found at: www.csta.acm.org.

• Lower-income schools do not teach CS at the rate of higher-income schools. Potentially, without the exposure to CS and the ability to enter into the 1,000,000 (and counting) CS-related jobs that will be unfilled and available by 2020, this economic disadvantage continues to be a vicious circle.[4]

This survey creates a clearer picture of CS education in U.S. high schools than we've had to date. At the local community, state, and national levels, this data can help inform continued and more thoughtful discussions about curriculum pathways, course design, and funding for CS courses, while guiding educators to come to a shared definition and solve the puzzle of teacher certification and other education policy issues. We must ensure that all U.S. students have access to modern curriculum and classes, including consistently defined CS courses, that will enable them to be college and career ready and contributing citizens today and in the future.

Recommended action items for the CS Community:

• Count CS courses toward high school graduation requirement in all 50 states and the District of Columbia and Puerto Rico.

• Come to an agreement about what we consider a rigorous, comprehensive CS curriculum, as well as how to implement common standards in all states and districts.

• Even though CS classes may count toward math or science credits, administrators must ensure that they are actually regarded as such.

• Create a national funding plan so that all students have equitable access to CS education.

*To review the complete results from this survey, as well as previous CSTA high school surveys, please visit* csta.acm.org/Research/sub/HighSchoolSurveys.html. *The CSTA Research Committee is currently developing a new study to capture more data that will help inform the state of secondary CS education in the classroom.*

[4] U.S. Bureau of Labor and Statistics, 2014-2015 Occupational Outlook Handbook, January 2014. The OOH reflects BLS employment projections for the 2012-22 decade.

## Winners of the CSTA/Oracle Survey Drawing

**Classroom set of Finch Robots**
Ben Gertner, Assistant Principal, Theodore Roosevelt High School, Los Angeles, CA

**Winners of 3D Printers**
Chris Medenwaldt, Principal, Monroe High School, Monroe, WI
Douglas Polomis, Middle/High School Principal, Coleman School District, Coleman, WI

## Congratulations, CSTA Members

**Dr. Tim Bell** from the University of Canterbury (UC) has been awarded the Excellence in IT Education award and the IITP President's Award for Contribution to the IT Profession at the inaugural New Zealand Excellence in IT Awards ceremony (*www.nbr.co.nz/article/excellence-it-winners-announced-black-tie-event-ck-164036*).

**Jeff Gray**, Department of Computer Science at the University of Alabama, and **Mark Guzdial**, College of Computing at the Georgia Institute of Technology, have been recognized as 2014 ACM Distinguished Educators (*awards.acm.org/distinguished_member/year.cfm)*.

## Meet the Authors

**Diane Boulanger**
*Educator, Canada*
Diane is a French Immersion teacher with an interest in math, science and technology.

**Simon Humphreys**
*CAS Coordinator, England*
Simon is the National Coordinator for the Computing At School working group. He has overseen the development of CAS from a small group of 20 to an organization of over 15,000 members.

**Michael P Jones**
*Educator, England*
Michael is a CS teacher working in the English High School system. He works with CAS and other organizations in training primary teachers. He also works with the new University of Greenwich PGCE in Computing and ICT.

**Michelle Lagos**
*Educator, Honduras*
Michelle is a CS teacher at the American School of Tegucigalpa. She served as the International Representative on the CSTA Board of Directors from 2012 to 2014.

**Oscar Pérez Ramírez**
*Advisor, Costa Rica*
Oscar is an Educational Informatics Advisor of the National Program of Educational Informatics MEP-ODF of the Costa Rican Republic. Previously, he taught CS and primary school.

**Mina Theofilatou**
*Educator, Greece*
Mina is the International Representative to the CSTA Board of Directors. She is an electrical and computing engineer employed as a secondary teacher in Kefalonia, Greece.

# News from Costa Rica

*Educational Informatics of the Costa Rican Republic*

**Oscar Pérez Ramírez**

Costa Rica is one of the pioneer countries regarding the integration of technology and education. In the late 1980s, Costa Rica began implementing a national program using computers in education, which is characterized by two specific features:

- An emphasis on the development of cognitive capacities by learning computer programming, and
- A program executed as a private-public alliance between the Ministry of Public Education and the Omar Dengo Foundation (PRONIE MEP FOD).

The alliance also involves various partners such as universities, private companies, international organizations, and others, which guarantees the continuity of policies beyond governmental periods. The vision is focused on the development of strategic human capabilities through the use of technologies to promote thinking, creativity, and productivity. Technologies have not been the purpose of the program, but rather as tools to boost educational objectives.

The proposal selected for the incorporation of technologies in Costa Rican educational environments in the early years included the use of Logo and the epistemology of Seymour Papert. The initiative included the purchase of equipment and the creation of a Latin American center for training and research in computer education. The first group of teachers was trained by MIT trainers led by Seymour Papert.

Two approaches have guided the initiative's development:

1. An ambitious vision of what could be the contribution of Information and Communications Technology (ICT) to education, focusing on the development of strategic capabilities in people and on the concept of technology as a tool to think and create.
2. A clear awareness that access to technology, in itself, does not produce any meaningful educational results, if it is not accompanied by a well-defined pedagogical proposal, training processes, continuous support to teachers, and a management model that allows sustainability over time.

This program has been evolving for 27 years and is the main initiative of ICT in education in Costa Rica. By March 2014, the program covered 71% of students enrolled in the public educational system, and expects that coverage will reach 82% by the end of this year.

In the beginning, the program worked at the preschool and primary education level. Starting in 2002, the program included secondary schools, previously under a separate program run exclusively by the Ministry of Public Education since 1985. In the initial educational model, children learned to program with LogoWriter. Learning Logo was meant to generate better opportunities for cognitive development through intellectual constructs. An updated version of Logo called MicroWorlds was introduced in the 1990s. In addition, the computers used in the program support all kinds of software for educational services, enabling users to use a wide variety of other tools.

Programming is an important part of the program and employs a wide variety of languages, including Scratch and Alice, and accompanied by an increased amount of local and online educational software.

In recent years, in addition to the Educational Informatics Labs, laptops have been introduced into the classrooms in a variety of ways: one computer per child in rural and marginal communities where the digital gap is deeper, and mobile computer labs in other communities. The purpose is to increase access to computers for both students and teachers, and to use the devices to complement and support the curriculum. As of today, almost half of the schools covered by the program include these alternatives.

In 2010, a series of didactic guides for teachers were published with detailed guidance on how to manage the Learning based Projects (LbP) according to expected performance standards (*fod.ac.cr/guiasdidacticas*). The guides assist teachers through the implementation of a specific project with students at every level (from kindergarten to higher secondary). As they gain experience in applying the LbP, teachers can adapt the guidelines and design new educational guides based on student performance standards.

The expectation is that educators use these didactic guides as a reference for their daily work and as a source of guidance for school directors. The didactic guides:

- Help the educator manage the learning process of students in reaching the performance standards;
- Lead students to become involved in answering interesting questions through the construction of digital products.

# News from Honduras

*CS Education in Honduras*

**Michelle Lagos**

Honduras is located right in the heart of Central America. It is an underdeveloped country that struggles with providing education for all of our children. What role does computer science (CS) play in our educational system?

To better understand challenges that CS education faces in Honduras, it is necessary to have an understanding of our National Education System. Honduras is divided in 18 departments with various municipalities. Within the municipalities, our Education Ministry has created districts.

There are three main categories of schools in Honduras: public schools (Spanish-language only), private schools (also Spanish-language only) and private bilingual schools. The school year for students in public and other Spanish-language-only schools is from February to November, while students in private bilingual schools attend from August to June.

Within the private bilingual schools there are two subcategories, those that are accredited by an accreditation agency in the U.S. and the ones that are only accredited locally by the government. Why is this important? Although all schools must comply with the National Basic Curriculum to grant Science and Language Baccalaureates, bilingual schools that are accredited must comply with the requirements from the accreditation agency to also grant high school diplomas similar to U.S. diplomas.

Our National Basic Curriculum lists "technology" as a mandatory course K–11 for graduation (our education system ends in eleventh grade). The elementary and middle school technology courses focus on application computing. At the high school level, students move directly to programming

without a transition or preparation in the foundational skills important for success in CS.

It is my belief that the Honduras education system does not have a clear concept of either technology or CS, and therefore, the curriculum seems to be all over the place. Graduation requirements are based upon the number of class hours and not the content of the courses taken.

CS teacher accreditation is also a challenge in Honduras. For a teacher to teach in Honduras, the Ministry of Education requires a bachelor's degree in education. There are specific accreditations for teachers in math, language, social studies, civics, science, physical education, and music; there is no specific accreditation for CS. CS is considered part of the math teacher bachelor's degree. A master's degree in educational technology is offered by the Universidad Pedagógica Francisco Morazán, which is a step in the right direction toward specifically accrediting CS teachers. Typically, either a general education teacher gets enough training to feel capable of teaching CS, or a CS professional gets certified to teach. The second choice is a more effective solution for proper instruction in CS, but neither is ideal.

The biggest challenge for quality CS education in Honduras is the discrepancy in the quality of education found among the categories of schools. Private schools, in general, can afford better equipment and better teachers; schools that also adopt learning standards such as those from CSTA, Common Core, and ISTE have better programs.

But public schools, especially in the most rural areas, can barely afford desks, boards, and books, so computers are simply out of the question. Many organizations help our public education system, but it is not enough. As a result, we have a mandatory course that cannot be taught because of lack of equipment, materials, internet access, or adequately trained teachers. The public education system has more urgent priorities than making sure that all schools are appropriately equipped for the mandatory technology course.

It would be helpful if the Honduran education system clarified the expectations for student learning related to the use of technology, application computing, and CS; developed a uniform and realistic curriculum for all technology; and provided more equitable access to computing for all students in all schools. And then, CS teacher accreditation should be included in the requirements to teach CS in Honduran schools.

# News from England

## Computer Science at the Start of a New Era

**Michael P. Jones**

The 2014–2015 school year looms large in the English education system. This date marks the start of a new curriculum structure for most subjects in state schools. Amongst these is the new curriculum for computer science (CS). This is 'new' in two senses of the word: prescribed content areas will be required to be delivered and, perhaps more importantly, this marks the start of a new curriculum area that all pupils of compulsory school age are entitled to as a right.

Given the English system, where all schools are subject to inspection, the inclusion of a mandatory subject area is of great importance. Schools stand or fall on how well they deliver a range of subject areas. No school in England wants to receive a "3" or "4" inspection result: "3" means repeated visits and closer scrutiny; "4" can mean closure and most certainly high levels of scrutiny.

The journey to CS as a new subject area has been swift and not without concern. One of the main questions continues to be "who will teach the new curriculum?" There are more than 3,000 state secondary schools and approximately 17,000 state primary schools in England. Simple arithmetic might suggest that to place one teacher capable of delivering the subject in each school gives a need of around 20,000 teachers. There are not that number of teachers with anywhere near significant or even minor first degree elements that would qualify them to join new trainee teacher programs.

The new English CS curriculum is terse to say the least. It amounts to four pages of content direction for each major Key Stage—this covers ages four to sixteen (*www.gov.uk/government/publications/national-curriculum-in-england-computing-programmes-of-study*). The direction does not prescribe how or what should be taught but rather focuses on key concept areas and topic headings. As a subject specialist, I welcome the lack of prescription as it allows me to consider what content would best suit my pupils. This is reliant on my having two key attributes: sufficient subject knowledge and pedagogical expertise.

Teachers with some CS in their degrees and/or teacher training programs may be expected to have the capability to choose, those who do not have this background face a daunting task. Many organizations are busy preparing and delivering programs that support this transition. For example, the curriculum support organization, "The PiXL Club," has recently delivered a four-day program focusing on preparing tenured teachers to deliver the programming component aimed at pupils in the 14–16 age range. That places 120 reformatted teachers back into the system. As a practicing teacher, I receive innumerable e-mails and flyers asking me if I am ready for the September deadline.

While confident in the curriculum content, I am in the position of wondering how 170 pupils will be taught the examined curriculum within my school—a rise from 40 in the previous year. Thankfully, I am working with members of staff who are willing to adapt their skills in readiness and a timeline flexible enough to work around issues.

Money is not necessarily the answer to teacher recruitment. A graduate with a 2i degree applying for a teacher training program is automatically entitled to $32,000 with the opportunity to apply for an extra $8,000—tax free and nothing to repay. I am involved in recruitment for a major English university. We are not yet at capacity and colleagues in other universities are in a similar position.

It is not all gloom though. I have witnessed five excellent teachers train as CS educators during the past year. Needless to say, they have all secured employment and will see their value increase as the new curriculum embeds. Although the journey is by no means secured with a clear map, we now have examined programs that provide secondary pupils with qualifications that will be recognized by commerce and industry. With 60% of content focused on practical programming, programming theory, and problem solving, we are seeing a move from bricklayers to architects at the upper end of the school system.

**LEARN MORE:**
*www.computingatschool.org.uk*
*www2.gre.ac.uk/study/courses/pg/seced/ict*
*ocr.org.uk/qualifications/by-subject/computing*

# More News from England

## A National Curriculum for Computing

**Simon Humphreys**

In almost every country in the world, the realization has dawned that young people should be educated, not only in the application and use of digital technology, but also in how it works and its foundational principles. Lacking such knowledge renders them powerless in the face of complex and opaque technology, disenfranchises them from making informed decisions about the digital society, and deprives our nations of a well-qualified stream of students enthusiastic and able to envision and design new digital systems.

After a decade of stasis, change has come to the computing curriculum in English schools and computer science (CS) is now part of every child's education. This change has been driven not by institutions or by the government, but by a grass-roots movement of parents, teachers, university academics, software developers, and others. A key agent in this grass-roots movement — although not the only one— is the Computing at School Working Group (CAS) (*www.computingatschool.org.uk*).

The National Curriculum for computing aims to ensure that all pupils:

- Can understand and apply the fundamental principles of CS, including logic, algorithms, data representation, and communication.
- Can analyze problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems.
- Can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems.
- Are responsible, competent, confident, and creative users of information and communication technology.

These goals are not without challenges, not least in supporting teachers new to the subject. Even the most confident teachers are sailing into uncharted waters.

Some schools may still be grappling with, "Why are we teaching computing?" Others may well have embraced the need for change: the need to equip a new generation with the tools to make sense of a rapidly changing technological future. But that still begs the question, "What do we need to teach children to develop their ability to 'think computationally'?" There is no shortage of resources, but welding them into a coherent scheme of work will take time. Schools will need to be flexible and willing to adapt as pupils become exposed to the core ideas of computing at an increasingly earlier age.

Even those schools with established schemes of work and subject expertise will be asking, "How do we teach these concepts effectively?" Teachers are well aware that learning requires effective pedagogy, enthusiasm, and deep subject knowledge on their part and for time-strapped teachers this is not easy. However, CAS maintains that professional development must be grounded in professional relationships and confidence levels of the people involved. CAS is providing small grants to experienced teachers to support colleagues in their community with both subject knowledge and pedagogy. Called "The Network of Excellence" (NoE), we are supporting hundreds of teachers by building local communities of practice whose sharing involves local, face-to-face, peer-to-peer delivery. CAS also runs, though its network of enthusiastic volunteers, over 120 local "hubs"— informal, teacher-led meetings to sharing ideas, best practice and resources. In addition, we have an online forum and resource sharing site. With over 1000 people joining in October and over 2000 comments and posts, it is a thriving and busy community. Through further funding provided by the Department for Education, CAS is running over 800 workshops in primary schools and providing high quality resources for primary teachers (*www.barefootcas.org.uk*) and in 2015, with support from Microsoft, we will be launching the QuickStart Project, a Computing CPD toolkit for teachers.

What we have learned is that the most important part of developing our new curriculum will come from reflecting on our experiences and discussing them with supportive colleagues. That is what CAS is all about— a genuine community of practice, founded on a willingness to try things. Good teaching is, above all, a collegial activity.

# Stay Informed with the Listserv

## Alert! Did you know?

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# News from Canada

## Integrating Coding across the Curriculum

**Diane Boulanger**

The Canadian education system keeps pace with the rapid changes in technology by recognizing both teachers and students as learners. We are connected to the world and innovation and exploration are integrated into our learning environments.

Knowing that computer science is everywhere and that software developers are in demand, I decided to teach coding in my third and fourth grade French Immersion program. It was a difficult decision at first because I'm supposed to TEACH FRENCH. When I discovered that there were many classroom projects that students could create with code, and that the connections coding created to their leaning of the French language (as well as in other subject areas) could be enhanced with coding skills, I was convinced of the value of an integrated approach.

I teach with Hopscotch, an iPad app using a block-based language that enables students to create posters, games,

stories, and designs across the curriculum. The Hopscotch online community features programs and projects that young learners can emulate while learning the basics of coding and also gives them the opportunity to share their creations.

Several history timelines from my classes were featured on the Hopscotch community. Some of my students who were struggling with traditional pen and paper writing are quite engaged with technology and are now becoming some of my most prolific coders and writers. Students used Hopscotch with iMovie, ExplainEverything, and YouTube to create French audio books to be shared online, songs about the environment for our school assemblies, and videos to visually explain their mathematical thinking. The playful and purposeful creativity that happens when students are coding made the integration a resounding success.

Activities to enhance gender equity in technology classrooms are common and education leaders and researchers are working on strategies to engage more women in the tech industry. It is my belief that by coding at an early age, a girl will not develop negative stereotypes, but rather develop a positive, creative, and playful self-image as a computer scientist. In my classes, I see both girls and boys as proficient coders using the tools in a variety of learning experiences.

## Equity Initiatives

### Faces of Computing

The Equity Committee of the CSTA is pleased to announce the winners of this year's Faces of Computing video contest. The goal of the student contest is to showcase a diversity of students and computing activities. Videos featured programming, 3D printing and design, web development, music, and more. View the winning entries at *blog.csta.acm.org/2014/12/08/winners-of-faces-of-computing-contest/*.

Thank you to everyone who entered.
The CSTA Equity Committee: Laura Blankenship, Mina Theofilatou, Alfred Thompson

**High School Division**
Massachusetts Academy of Math & Science, Worcester, MA
Teacher: Angela Taricco
Students: Josephine Bowen, Sarah Duquette, Jackie Forson, Ana Khovanskaya, Eva Moynihan, Amol Punjabi, Sashrika Saini, Christopher Thorne, Ryan Vereque

**Middle School Division**
Foundation of Al-Ikhlas, Gili Timur - Kamal Bangkalan, Indonesia
Teacher: Idrus Tamam
Student: Uluwiyah Jatim

**Elementary School Division**
Hale Kula Elementary School, Wahiawa, HI
Teacher: Megan Cummings
Students: Kaylee Smith, Markus Langhammer-Kenan, Kaleah Shabazz, Haylee Barlow, Natalie Chastain

## Attention Job Seekers and Employers

The CSTA Career and Job Center is the perfect place for job seekers and employers in K–12 computer science (CS) education to find each other!

**Job Seekers**: The CSTA Career and Job Center will help you find your next great career opportunity in our searchable database of CS education jobs. Search CS education jobs in academia and corporate including: CS teacher, technical coordinator/administrator, curriculum developer, K–12 CS education outreach coordinator, and others. Post your resume, and take advantage of free career tools for job searchers. These services are provided FREE to CSTA individual educator members.

**Employers**: Get started today by creating a company profile, posting your available jobs, searching resumes, and begin your search for an exemplary educator. What better place to find talent than your own CS community?

To access the CSTA Job Board, visit: *http://cstajobs.acm.org* or click the Job Board button from the CSTA homepage.

## Bits and Bytes

The CSTA Advocate blog was listed among the "Top 30 Computer Science and Programming Blogs" for 2014 by the Computer Science Degree Hub. Also included was CSTA member Alfred Thompson's personal blog. See the full list at: *www.computersciencedegreehub.com/top-30-computer-science-programming-blogs-2014*.

The Piedmont Unified School District in California has voted to implement the CSTA K-12 CS Standards. Rajendra Shrivastava, a CS teacher at Piedmont High School, will lead the implementation. Read more at: *tphnews.com/2014/10/district-adopts-new-computer-standards*.

Take a look at the CS Events for Kids section on the CSTA website. CSTA's institutional members provide a wide range of events (camps, contest, etc.) for kids from elementary through high school. Contact the organizations' sites directly from: *www.csta.acm.org/Resources/sub/CSEventsforKids.html*

### SHOW ME THE NUMBERS
#### CSTA WORLDWIDE MEMBERSHIPS

| | |
|---|---|
| Total CSTA Membership | 18,315 |
| International Membership | 7,000 |
| U.S. Membership | 11,315 |
| Number of Countries Represented | 141 |
| Countries with Largest Memberships | United States, India, Canada, Philippines, United Kingdom |

Source: CSTA Membership Database

csta Voice
Computer Science Teachers Association
2 Penn Plaza, Suite 701
New York, NY 10121-0701

We're on the Web: csta.acm.org
Like our Facebook page!

## More Resources from CSTA

• **CSTA K-12 Computer Science Standards:** This document delineates a core set of learning standards designed to provide the foundation for a complete CS curriculum.
*csta.acm.org/Curriculum/sub/K12Standards.html*

• **Bugs in the System: Computer Science Teacher Certification in the U.S.:** This report details the results of an 18-month research project to determine the nature of CS teacher certification in the U.S. The report includes state "report cards" that clearly show that each state has its own process, its own definition of CS, and where it fits in a young person's educational program.
*csta.acm.org/ComputerScienceTeacherCertification/sub/CertificationResources.html*

• **Posters, Brochures, and Videos:** In this section, you will find several downloadable posters and brochures that showcase CS. There are also links to videos and other classroom resources.
*csta.acm.org/Resources/sub/BrochuresPostersVideos.html*

• **Advocacy Tools:** This collection includes presentations, toolkits, and supporting information to help inform and convince parents, fellow educators, administrators, and state legislators about the importance of CS education for everyone.
*csta.acm.org/Advocacy_Outreach/sub/AdvocacyTools.html*

• **Featured Reports:** From statistics on the significance of CS education in our digital economy to strategies for addressing equity issues in CS education, the collection of key reports is an invaluable resource of information pertinent to the state of CS education.
*csta.acm.org/Communications/sub/Reports.html*

If you haven't explored the CSTA website lately, it's worth visiting again to discover the growing collection of resources.

For the latest and greatest tips & tricks and news & views, check out
The Advocate Blog
*blog.csta.acm.org*

## MARK YOUR CALENDAR

**Google Code-in Contest**
December 1, 2014–January 19, 2015
*www.google-melange.com*

**ACSL Contest #2 Deadline**
February 13, 2015
*www.acsl.org*

**SIGCSE 2015**
March 4–7, 2015, Kansas City, Missouri
*sigcse2015.sigcse.org*

**ACSL Contest #3 Deadline**
March 13, 2015
*www.acsl.org*

**Consortium for Computing Sciences in Colleges**
(Southwestern)
March 27–28, 2015, Claremont, California
*www.ccsc.org/southwestern*

**Consortium for Computing Sciences in Colleges**
(Central Plains)
April 10–11, 2015, Point Lookout, Missouri
*www.ccsc.org/centralplains*

**Consortium for Computing Sciences in Colleges**
(Mid-South)
April 10–11, 2015, Conway, Arkansas
*www.ccsc-ms.org*

**ACSL Contest #4 Deadline**
April 17, 2015
*www.acsl.org*

**Consortium for Computing Sciences in Colleges**
(South Central)
April 17–18, 2015, Austin, Texas
*www.ccsc.org/southcentral*

**Consortium for Computing Sciences in Colleges**
(Northeastern)
April 17–18, 2015, Worcester, Massachusetts
*ccscne.org/conferences/ccscne2014*

**ACSL All-Star Contest**
May 23, 2015, Orlando, Florida
*www.acsl.org*

**2015 CSTA Annual Conference**
July 12–14, 2015, Grapevine, Texas
*cstaconference.org*

**Check the most recent CSTA events on the CSTA website**
*csta.acm.org/ProfessionalDevelopment/sub/TeacherWorkshops.html*
List your CSTA event by contacting *t.nash@csta-hq.org*