CSTA is a membership organization, and it’s through our local chapters that most members engage with CSTA—in face-to-face meetings with their peers. Many computer science (CS) teachers are the only ones in their school teaching CS, and their local CSTA chapters provide their only opportunities to build CS community and share ideas with colleagues.

In states with strong chapters, teachers rave about the value that is delivered by being part of their local chapter communities:

“Without the ability to get feedback and ask questions of other chapter members, I would really struggle with differentiation in my classroom, both for the advanced student as well as for the student who needs significant scaffolding.” (California)

“I really appreciate my CSTA chapter because it keeps me current on information and opportunities. I also have a connection to other teachers who, like me, are teaching in places where there is only one computer teacher per school. The chapter is also a place to give voice to policies such as the new digital learning standards.” (Massachusetts)

“Our CSTA chapter members created a common vision that has helped promote CS education across the state and support teachers who are introducing new CS courses at their schools.” (New Jersey)

“My CSTA chapter was a breath of fresh air from the normal lack-of-support battles I was fighting daily in my school. My chapter was the only escape from my island of
being the only CS person in my school/district. It was great to get together with like-minded individuals, learn about new tools and tricks, and for just a moment, not feel like I’m fighting an uphill battle!” (Illinois)

“Our chapter community is committed to improving our teaching practices and sharing CS curricula that could benefit all students. Our members involved their students in the Technovation Challenge, robot competitions, programming competitions, and other events sponsored by our local universities and businesses. Also, we sought out opportunities to develop local teacher-leaders in PD and advocacy in our state.” (Massachusetts)

For an organization that relies significantly on member-volunteers, strong local leadership makes all the difference. Teachers in regions with active, vibrant chapters were grateful and appreciative for the learning opportunities and collegial support that their chapters provided.

Among the most important tasks for CSTA is to provide support for teachers to establish and sustain strong chapters. Participating in CSTA’s leadership training workshops helps teachers build the skills necessary to create strong, vibrant chapters that provide a local presence of CSTA for teachers across the US. Join a CSTA chapter or ask about creating one today at: www.csteachers.org/page/ChaptersbyRegion.

CONGRATULATIONS, CSTA MEMBERS
Dave Reed, Tammy Pirmann, and Bryan Twarek attended the Korea Foundation for the Advancement of Science and Creativity (KOFAC) in Korea. The KOFAC and CSTA signed a memorandum of understanding for strengthening the global cooperation for software education of K–12 students at the first Global Software Education Forum. KOFAC seeks cooperation to develop its software education projects such as the exchange of the K–12 software education experts and sharing teaching and learning materials between countries. Learn more at: globalsw.kofac.re.kr.
TEACHING CS AWARDS ANNOUNCED

The 2016 Infosys Foundation USA/ACM/CSTA Awards for Teaching Excellence in Computer Science recognize talented computer science teachers at the pre-university (K–12) level around the world. Congratulations to the 2016 Awards for Teaching Excellence in Computer Science award recipients!

Eric Allatta (Academy for Software Engineering – New York, NY)
Jacqueline Corricelli (Conard High School – West Hartford, CT)
Karen Donathan (George Washington High School – Charleston, WV)
Farrah Falco (STEM Magnet Academy – Chicago, IL)
Steven Floyd (Mother Teresa Catholic Secondary School – London, Ontario, Canada)
Ray Kinne (San Diego High School – San Diego, CA)
Robert Luciano (Pocono Mountain East High School – Easton, PA)
Daniel Moix (Arkansas School for Mathematics, Sciences, and Arts – Little Rock, AR)
Jared O’Leary (Desert Thunder School – Tolleson, AZ)

Each will be awarded a prize of $10,000 at the 2017 CSTA Annual Conference in Baltimore, July 2017 (cstaconference.org). For more information on the award visit: www.csteachers.org/?page=CSTeachingAwards.

THE INTRODUCTION OF CSTA MEMBER DUES

Later in 2017, CSTA will begin implementing member dues. We will share more details in the months ahead but wanted to take this opportunity to begin addressing questions members may have upon hearing the plan to implement dues.

Q: Why dues?
A: Charging dues produces several distinct benefits to the association and its members. For example:

- The implementation of dues provides greater credibility for a profession and demonstrates that the profession believes the organization provides value.
- It provides a mechanism to measure member commitment and engagement to the organization, which are useful metrics to share with potential funding sources.
- Dues often have a psychological effect of increasing member engagement and participation because individuals have “skin in the game” to see the organization be successful.

Q: How much will dues be?
A: We have not yet finalized the dues structure. We have more work to do on the membership groups and benefits before we can finalize what dues might be. Right now, we are discussing numbers in the $25 to $50 range.

Q: Will there still be a free dues option?
A: YES! CSTA plans to maintain a free membership level. This will contain many of the current benefits, such as receiving the Voice and Computer Science Today, the ability to attend the CSTA annual conference, and the option to participate in or lead local chapters (where available). Dues-paying
members will be entitled to a range of additional benefits.

**Q: What will be the additional benefits for dues-paying members?**

**A:** We are in the process of defining the membership benefits for dues-paying members by member grouping. For example, K–8 teachers may find one set of benefits useful, 9–12 teachers a second set, and higher education members still a third set. We also recognize that many members already receive “traditional” association benefits through other K–12 teacher associations.

Our goals are as follows: (1) keep the cost low and affordable, (2) be certain that the value of benefits financially exceeds the membership cost by at least 50 percent, and (3) provide a set of unique benefits packages specifically designed for computer science (CS) teachers. Sample benefits may include joint membership with other organizations, reduced price conference registration, unique or first-chance professional development (PD) opportunities, or access to additional content resources. We will share more information on the benefits in the months ahead.

**Q: How will dues be used by CSTA?**

**A:** One hundred percent of dues will be applied to member programs. Currently, we propose allowing teachers a choice, and these are choices we’re considering.

The first choice would be that dues get applied to support a local chapter. CSTA currently lacks funds to actively support chapters and some chapters have considered the implementation of dues. This approach allows chapters to have dues-based income without the challenges and additional work for chapter leaders related to collecting and reporting chapter dues.

The second choice would allow members to apply their dues toward general PD programs, such as supporting conference scholarships, attracting additional strong speakers, implementing webinars, or other programs that increase the accessibility of PD for all CS teacher members.

We may identify additional options based on member feedback. For example, higher education members might designate funds to support future CSTA research initiatives. The important thing to know is that we intend to apply 100 percent of funds received through dues directly toward member designated programs.

**Summary**

We know that moving to a dues-based model is a big change for CSTA. We know many CSTA members take pride in the fact that we currently do not charge dues. However, the expectations of what CSTA can, should, or must do for its members continues to grow. Many funding sources express surprise that we do not currently receive financial support from our individual members. We approached this topic in a slow and deliberate fashion and will not effectively begin assessing dues until we are confident that the benefits package is sufficiently compelling and valuable for members.

We welcome your input and feedback, as well as suggestions for what benefits members would find most valuable.

Please send your feedback to: membership@csteachers.org.

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**IMPORTANT: To receive CSTA announcements via email, you must opt in.**

If you’re not receiving announcements from CSTA and don’t want to miss news about member benefits, visit:

visitor.r20.constantcontact.com/manage/optin?v=001-LUVny3yzxWvmrqvipeuG3ARDVtRef2z
In Illinois, there are over 800 school districts. Of those 800 school districts, well over 200 are in the 10,000+ square mile, six-county metropolitan area surrounding the city of Chicago. Close to one million K–12 students attend a public school served by these districts, and this does not include the nearly 400,000 served by the Chicago Public School system itself. As computer science (CS) education became increasingly prevalent in the national discourse, there emerged a clear need for a specific focus on the students served in the Chicago metropolitan area surrounding the city of Chicago. This ultimately gave rise to the formation of the Chicago Suburban Chapter of the CSTA, which, from its formal adoption in 2013, holds as its primary mission to serve as a bridge to any professionals in this vast and diverse region with an interest in CS education to move off their respective “islands.” Part of our success as a CSTA branch is a plan of coordinated communication strategies. It begins as soon as someone joins…

Joining is easy and free. Anyone with a membership in CSTA can join our Chicago Suburban Chapter email distribution group through a link from our website (bit.ly/chisuburbanCSTA). The chapter leadership team connects with each new member through an individualized email, a phone call, or even on occasion, a face-to-face meeting to discuss the new member’s needs and desires. This helps establish for newcomers a connection to the cornerstones of the organization—communication, connectivity, sharing, and inclusiveness. On many occasions, the communication has grown into informal mentorships between members.

The chapter holds regular, monthly, in-person meetings between September and May on a weekday evening at locations near major expressways or otherwise convenient spots. All members of the chapter receive an RSVP email approximately two weeks prior to the meeting and are invited to add discussion items for inclusion on the agenda.

Meetings span a variety of topics that are at the heart of the current national CS educational discourse, such as access to quality teacher training, clarity around teacher licensure issues, and improving student access to CS education across the many districts in the region—each with its own background and needs. However, the true “bread and butter” of our in-person meetings lies in the informal conversations that happen around topics such as curriculum, assessment, evaluation, and pedagogy. With CS continuing to evolve arguably faster than any other discipline at the K–12 level, coupled with what remains a lack of clear research-based pedagogy around effective instruction and assessment specific to CS, teachers derive benefit from sharing ideas, lessons, and instructional tools for helping students learn CS. We have a long-standing tradition of closing our meetings with the request that every attendee commits to bringing one instructional or curricular “artifact” to share with other attendees to the next meeting, ensuring that attendees have a collection of “take-aways” that they can potentially use in their classrooms. For those unable to attend our meetings, we post the minutes and artifacts on our website.

Editor’s note: Find a complete list of CSTA chapters by region at: www.csteachers.org/page/ChaptersbyRegion.
Our communication strategies continue beyond our chapter membership. We maintain a strong tradition of communication and sharing with our neighboring CSTA Chicago Chapter. The membership and leadership of the Chicago Chapter has set the bar high nationally in both what it has accomplished for students and for teachers. The Chicago Chapter and the Chicago Suburban Chapter collaborated to locally host a high school programming competition in the region. ProCom 3.0 (procom.strikingly.com) is exemplary of the kind of exciting and rewarding work that comes from a shared mission and great communication between chapters. Each of the hundreds of districts in the Chicago area has its own advantages and challenges and there is much to be gained through collaboration.

With what was started three years ago, as a small group of high school teachers looking to take a step toward moving off our own islands to learn from each other, we have evolved into a chapter of over 80 members from throughout the multi-county region. Still, we have much work to include more K–8 teachers, as well as teachers in the southern suburban Chicagoland area. These remain our long-term goals. In the meantime, we continue to work on the platform of being a reliable, sharing, and inclusive support network for anyone with a stake in seeing #CSforAll become a reality for the nearly one million students served across the Chicago metropolitan area.

NOMINATIONS ARE NOW OPEN FOR POSITIONS ON CSTA'S BOARD OF DIRECTORS

Dear CSTA Members,

CSTA relies on our dedicated and talented members to contribute to our organization in many ways, including by serving on the CSTA Board of Directors. We encourage interested CSTA members to apply or to encourage other qualified members to apply.

Nominations are now open for five positions on the Board of Directors for 2-year terms starting in July 2017.

The process is as follows:
1. Qualified members submit an application for nomination (due January 31, 2017).
2. The Nominations and Elections committee selects the two most-qualified applicants for each open position.
3. Nominees are announced and voting begins in February.
4. Election results will be announced on April 1, 2017.

For the 2017 election, there are five open seats: K–8 Teacher Representative, 9–12 Teacher Representative, School District Representative, At-Large Representative, and Teacher Education Representative.

For more information about these positions and for application materials, go to www.csteachers.org/page/Governance and look for the link, “Call for Nominations.”

As Chair-Elect of CSTA, I would like to personally invite you to apply for a board position. If you have any questions, please contact me at nominations@csteachers.org. I look forward to working with you on behalf of CSTA.

Yours,
Fred Martin, Chair-elect
CSTA Board of Directors
THE PATH TO A SUCCESSFUL CHAPTER

Adam Swift

Editor’s note: Building an active CSTA chapter requires creativity, enthusiasm, and passion. CSTA Southern New Jersey has added collaboration to that formula to create a dynamic chapter in just two years. We hope their story inspires you!

What started as a simple plan to provide collaboration opportunities for computer science (CS) educators in southern New Jersey, has grown way beyond our expectations! From planning exciting programs and student activities, to supporting existing programs and creative new projects, the CSTA Southern New Jersey (CSTA-SNJ) Chapter is “all in” on supporting CS education.

CSTA-SNJ meets at Stockton University from 6:00–8:00 pm the first Wednesday of every other month. Attendance averages about 20 educators and other guests. Members can attend virtually through Google Hangouts and Twitter Periscope feeds, which are set up and moderated by our secretary, Michelle Wendt. Virtual attendance typically provides 5-25 additional members a chance to actively engage in the event.

An important element in the rapid growth of CSTA-SNJ has been the professional development provided by quality guest speakers. Our president, Lynne Kesselman, has been essential in planning great programs and securing guest speakers.

• Michael Kölling, developer of the Greenfoot programming environment, visited us from England to demonstrate and invite collaboration with educators interested in using the Greenfoot learning platform (www.greenfoot.org/door).

• Kevin Jarrett, a CSTA-SNJ founding member, demonstrated student projects using Makey Makey (makeymakey.com) to turn everyday items into touchpads, allowing users to interact with computers using ordinary objects.

• Mickey Keats presented from his station in Panama using Google Hangout on technologies to create 3D-printed prosthetic hands for children amputees in developing countries. His presentation was supplemented by an onsite display of 3D printed hands (enablingthefuture.org).

• Meredith Martin, CSTA-SNJ member, shared her knowledge on how to set-up an affordable and engaging maker space.

• Professor Dr. Jacqui Chetty, from the University of Johannesburg, shared ideas on how to encourage students using robots, specifically LEGO® Mindstorms. Dr. Chetty also presented at the Stockton University and several of our southern New Jersey K–12 members’ schools.

• Adam Greco, an unmanned aviation systems specialist from the Federal Aviation Administration, attended a meeting to present, “Keeping Up with the Droneses.”

These presentations have provided our members and guests (including local officials and school administrators) with knowledge and ideas on how to teach students, administrators, parents, and community members about the impacts of CS. Our meetings are archived and available via links on our chapter website (sites.google.com/a/csta-hq.org/cstasouthnj/home).

Additionally, CSTA-SNJ has been involved in community events. In January 2016, CSTA-SNJ members participated in the Stockton University “Day of Service” on the E-nable project. The goal of this project was to use 3D printers to build low-cost prosthetic limbs for amputees, with a focus on providing prosthetics to children. Members of CSTA-SNJ spent the day assembling the prosthetic pieces into workable hands.

In March 2016, we hosted a high school programming competition with the assistance of Stockton University IT staff and students, and Atlantic Cape Community College CS faculty. Over 100 local high school students participated. They enjoyed speakers, interactions with CS students and faculty, two hours of programming, refreshments, a raffle, and prizes. We hope to make this an annual event, with the next one being planned for March 17, 2017 (www.pressofatlanticcity.com/education/mainland-ocean-city-win-first-coding-competition-at-stockton/article_44af3816-ed52-11e5-a82d-6b0f67798d32.html).

In February 2017, CSTA-SNJ will be assisting with Hack Stock, the first-ever hackathon hosted at Stockton University. Both high school and university students are invited to participate.
In the summer, CSTA-SNJ members participate in NJEA Tech Stock as presenters and facilitators. NJEA Tech Stock provides professional development and is an opportunity for our members to encourage teachers to include CS in their teaching. We hold our chapter summer meeting, which is open to all conference attendees, at this event.

We are thrilled with the early successes of CSTA-SNJ. The past two years have been a whirlwind of activity; the results have been well worth the effort and we’ll continue to grow and create excitement for CS education. Our plans include future collaboration with North Jersey and Central Jersey chapters.

THE CS FRAMEWORK NEWS
A LOVE LETTER TO CS EDUCATION
Pat Yongpradit

The ACM, CSTA, Code.org, Cyber Innovation Center, and National Math and Science Initiative collaborated with states, districts, organizations, and hundreds of members of the computer science (CS) education community to develop the K–12 CS Framework. The Framework is a high-level vision and guide for informing the development of standards, curriculum, professional development, and teacher preparation pathways. Please visit: k12cs.org.

What does this matter to you in the K–12 classroom?
First, the Framework represents a vision in which students’ experiences with CS start before high school. If you’re a high school teacher, you will see more kids, and equally important, more diverse kids, signing up for your CS classes. Students of different backgrounds will not have built stereotypes that tell them that CS isn’t for them because they will have taken CS earlier, done well, and enjoyed it.

What should these students learn throughout their K–12 experience? As teachers, we know there often isn’t enough time in the week to do what we already have on our plates, but we also know the value that CS can bring to kids’ lives. The Framework identifies the most essential concepts and practices for students to know and do.

Second, the Framework espouses several key messages for CS education. We’ve heard of the “CS for All” movement, but what are the tenets of CS for All? Here I lay out three of the key themes from the K–12 CS Framework...

**Theme 1: CS is foundational**
Sure, there are lots of programming jobs out there, but CS education is not just about churning out coders. There are many reasons to learn CS:
1. There are lots of programming jobs open.
2. There are lots of computing jobs in a variety of fields.
3. There are lots of jobs that use CS knowledge and practices.
4. Computing is a part of our modern existence. We don’t study science because everyone will become a scientist. We don’t study math because everyone solves equations for a living. Members of society need to understand how our computational world works.

While these reasons are valid, the deeper you go, the more significant the rationale is for all students to learn CS, no matter their career interests or passions.

**Theme 2: CS > coding**
Popular media and politicians have rightfully connected CS with “coding” because it is easier to say and understand than “computer science.” While programming or coding is one of the key elements of CS, there is much more to the discipline of CS, and thus CS education. But what? computing systems, networks and the internet, data and analysis, algorithms, and the impacts of computing.

Now that the education world is listening, let’s show them the breadth that our discipline can offer so that we can engage students with a variety of interests. Whether you are a novice or experienced CS teacher, you have probably only taught programming. Read Chapter 6 of the Framework for an overview of these topics.

**Theme 3: CS for all students requires a new approach**
Positive equity practices must be a focus to achieve CS for all students. We can’t use the same teaching methods, curricula, assessments, contexts, and motivations that we have used in the past, as those methods have been shown...


to maintain gaps in diversity. A new vision for CS requires a new approach.

I don’t have much time. Which chapter must I read? First, you may not have to read any chapters. If you want an overview of the Framework, the website provides abridged versions of the major chapters. If you can read only one chapter, try Chapter 1: A Vision for K–12 CS. You’ll learn about the power of CS as a medium, see statistics on CS perceptions and access, and understand how CS is different from related areas, such as computer/digital literacy.

I’m sold. I want a greater diversity of students in my class; how can the framework help? Chapter 2: Equity in Computer Science Education will point you to some of the work already happening. Here you will learn about the lack of diversity in CS, but also feel empowered with ideas for making an impact with your teaching practices. If you can find just a little more time, read the section about curriculum in Chapter 8: Implementation Guidance, and learn about the effectiveness of socially-relevant and culturally-situated learning experiences.

I want to end by thanking every teacher. You are not only a soldier in the CS education movement (the “tip of the spear”), but also the whole world of CS to your students. Without your influence, they can not go on to become successful, confident adults. If any of you have ever had a student return to tell you how much of a difference you’ve made in their lives, or have received a LinkedIn request from a former student, then you know what I am talking about. A special shout out to my K–8 peers: Bless your heart. You are on the forefront of CS education. Anything you do makes a difference and paves the way for the rest of your students’ educational experiences.

Voices from the Chapters

Editor’s note: It happens in many organizations…members come and go, excitement ebbs and flows, and purpose focuses and fades. Perhaps it has happened to an organization you belong to. The good news is that if it happens in a CSTA chapter, there are resources and help to get back on track. Below are responses we received when we asked chapter leaders who experienced “dark days” about how they breathed new, energized, better-than-ever air back into their chapter. We hope their ideas help you…even if all you need is a little sparkle. Thank you to the following leaders for sharing their experiences:

Jennifer L. Albert, jalbert@citadel.edu, South Carolina

Amy Fox, AFox@valhallaschools.org, Lower Hudson Valley

Kamaljeet Sanghera, ksangher@gmu.edu, Northern VA

Marcus Twyford, president@cstaohio.com, Ohio

What was the motivation to revitalize your chapter?

[Albert] South Carolina is in the process of creating its own K–8 standards for CS and changing the current requirements for graduation. This will mean retraining many teachers. We recognized the need for a support system and decided that a CSTA chapter would fit the need.

[Fox] I was the only CS teacher in my district and was assigned new courses to teach (Game Design, Mobile App Development) and thought, “I wish I had other teachers with whom I could collaborate.” I remembered that there was a chapter long ago, and when I saw it no longer existed (and the nearest chapter met 3 hours away) I decided to re-charter the chapter to get others in my area together to learn and share teaching ideas and strategies.

[Sanghera] By revitalizing the chapter in Northern VA, I knew we would be able to work as a community.

[Twyford] I had seen some incredible energy around the national discussion of increasing access to computing.

How did you find a group of teachers to work with you?

[Albert] The teachers are those involved in the writing of the K–8 standards and others who have identified an interest. Our kick-off meeting was held in December.

[Fox] I used the Math Chair Regional Network to spread the word to their CS teachers about a planning meeting. The response was overwhelming!
[Sanghera] I worked closely with several schools and their teachers. There was interest in meeting once a month to discuss exciting work that everyone was doing in their schools and how we could collaborate to help each other.

What was (is) your greatest challenge?
[Albert] Our greatest challenge, right now, is determining the best way to help our teachers. We are trying to grow our chapter as quickly as possible this year before our state announces its new plans. We want teachers to know that we are here before they experience any panic.

[Fox] Our greatest challenge is getting good workshops organized. Currently, we’re sharing best practices on specific topics with each other, but we would like to get more presenters to help with topics we would all like to learn about. Our second greatest challenge is getting a bank account open.

[Sanghera] I wasn’t sure about the process to restart a chapter.

Who or what was your most valuable resource?
[Albert] Our most valuable resources have been our people. We have such breadth and depth of teacher experiences across the state and a willingness to help each other. It has been amazing to see everyone come together to support our teachers and our community.

[Fox] Our most valuable resources have been the CSTA Global Office and the website, which contains great material for chapters to use.

[Sanghera] Industry and university partnerships have been wonderful resources. We have enriched K–12 teaching experiences by learning from experts.

What success have you experienced?
[Albert] We are starting to see our chapter come to life as more teachers, community members, and industry partners are helping to make our Kick-Off event a success. The number of teachers interested in CS topics has soared; over 120 teachers expressed interest in one workshop alone.

[Fox] In our first year we had over 20 districts join and an average of 10 to 15 attendees at each meeting. We put together a student STEAM Tech Expo/Contest at the end of the year highlighting students’ projects. It was a great success and we look forward to the second Expo this year. We also began the practice of sharing teaching ideas on topics that students found difficult. We also share resources in a Google folder for the various courses we teach.

What would help you to be more successful?
[Albert] Funding! Nothing is free and teachers certainly are not paid enough to help support the organization. We are working on other sources of funding.

RESEARCH INSIGHTS
Jennifer Wang

Computer science (CS) should not just be for the privileged. The world is changing and technology is opening doors to amazing opportunities. A quality CS education is a right, not a privilege. In our efforts to expand CS education, we must ensure that opportunities are available to all students, regardless of background, demographic, or circumstance.

To provide data on the US context, Google has been collaborating with Gallup to explore current opportunities and disparities in K–12 CS education. In the second year of our research, we surveyed over 16,000 US students, parents, teachers, principals, and superintendents. Our recent report, Diversity Gaps in Computer Science: Exploring the Underrepresentation of Girls, Blacks and Hispanics (goo.gl/PG34aH), takes an in-depth look at CS education for underrepresented groups.

We found that these groups face both physical and social barriers. Black students are less likely to have access to CS classes in schools compared to White students, with 47% of Black vs. 58% of White students reporting access to dedicated CS classes and 44% of Black vs. 53% of White students reporting access to other classes where CS is taught. Black students also have less access to these classes compared to Hispanic students, but after controlling for income and parents’ education, this difference disappears.
Both Black and Hispanic students are less likely than White students to use a computer, with less computer use corresponding to lower confidence in learning CS—34% of Black and 31% of Hispanic students vs. 42% of White students use a computer every school day, and 30% of Black and 26% of Hispanic students vs. 45% of White students use a computer at home every day.

When looking at social barriers, we found support for the perception that CS is only for certain groups, despite the very high value of CS across students, parents, and educators (e.g., 84% of parents said that CS is more, or just as important, as current required academic classes, and 60% of educators overall agreed that CS should be required when available).

Even with no difference in access to CS learning by gender, girls are less likely than boys to be aware of such opportunities outside classes. This may be due to gender discrepancies in social support and exposure. We found that girls are less likely than boys to be told by a teacher or parent that they would be good at CS. In fact, 26% of girls vs. 39% of boys reported a teacher had told them this, and 27% of girls vs. 46% of boys reported a parent had told them this. And of students who reported seeing someone in the media engaged in CS, just 11% of girls vs. 21% of boys said that they saw someone “like me.”

Altogether, we found that students rarely see computer scientists like themselves in the media. By race/ethnicity, Hispanics are less likely than Blacks to see someone like themselves in the media (13% of Hispanic vs. 26% of Black students who see people in the media engaged in CS). Furthermore, Hispanic students are less likely to have exposure to a role model—only 49% of Hispanic students vs. 68% of White and 65% of Black students know an adult who works with computers or other technologies.

Not surprisingly, with less social support for girls and Hispanic students, we found that girls are less likely than boys to be very confident in learning CS (48% of girls vs. 65% of boys) and Hispanic students are less likely to be very confident in learning CS (51% of Hispanic vs. 56% of White and 68% of Black students).

However, teachers have the potential to make substantial positive impact. We found that regardless of race/ethnicity or gender, 80% of students who have learned CS learned it in a class at school. The next most common way of learning CS (on their own) included only 48% of students (likely just those who have the means to learn on their own).

And there is an appetite to learn CS. Black and Hispanic students are 1.5 times and 1.7 times as likely as White students to be very interested in learning CS. Parents whose child has not learned CS want their child to learn CS. This is particularly true for Black and Hispanic parents, who are even more likely than White parents to want their child to learn CS (91% of Black and Hispanic parents vs. 85% of White parents).

This research shows us that the lack of diversity in CS faces both systemic and cultural barriers. All of us serve as powerful influencers in students’ lives, and we need to be thoughtful with images of CS as well as whom we explicitly and implicitly support towards CS. With the complexity of social barriers, reinforced by physical barriers, many may unconsciously be treating certain groups differently—acting with unconscious bias—and perpetuating the CS diversity gap. We need to be aware of the disparate circumstances that students may be coming from and support everyone. Let’s ensure that CS education becomes a right for all students. Find more research and resources at: g.co/cseduresearch.

Editor’s note: CSTA thanks Google for their ongoing support of CSTA, its members, and CS education.
Back in July 2016, we announced our partnership with CSTA to give members in the US free access to the Codio platform for professional development purposes (www.csteachers.org/page/CodioProject).

We are now delighted to make another major announcement. In January 2017, we will be releasing a complete body of CSTA-aligned teaching content:

• Theory and practical curriculum aligned to the CSTA Framework (Middle School, High School Level A, and High School Level B modules).
• Integrated auto-graded assessments (code tests and multiple choice).
• Full online IDE for programming in any language and with any software components (databases, libraries, tools, etc.).

These modules are not just helpful for students. For CS teachers with little or no prior experience teaching CS, the Codio CSTA-aligned content and online IDE are great resources to familiarize themselves with the curriculum, strengthen their coding skills, and prepare for the classroom.

Teachers and students access the content of each module using a browser. However, where programming is required, the content sits within the Codio IDE, allowing code to be written and tested. The results from any auto-graded assessments contained within the content are sent to the teacher dashboard so a teacher can monitor student progress in real time. Teachers can also create coding projects from scratch, all in the cloud and in any programming language, with no installation or system administration setup or configuration. There is no need to worry about security as everything runs on the Codio platform.

“Don’t be too stressed out about taking computer science (CS)—it sounds like a tough subject, but anyone can learn it.”

We heard this sentiment often in our CS education research when we asked students what advice they would give other students who were thinking about taking a CS class. While this advice is directed at students, the same message could be expressed to a teacher about to teach CS for the first time. We know from our research that, like students, some teachers find certain subject areas, including CS, intimidating. The thought of having to learn CS content, as well as how to teach CS, can create anxiety.

As we work to expand learning opportunities in K–12 CS by preparing teachers to teach CS, we should look to students to understand what it is that they value in a CS teacher. In our research exploring the barriers and supports to implementing CS (BASICS study: outlier.uchicago.edu/basics), we work to highlight K–12 CS student voices, as they are too often left out in work on K–12 CS. As we began in this research, we asked ourselves, “What do students think teachers need to know about teaching CS?” and “What do students value in a CS teacher?” Students are, after all, the ones we intend to benefit; their voices and thoughts should not be overlooked.

As part of our study, we conducted focus groups with introductory CS students (N=46) at eight schools in Chicago, all using the Exploring Computer Science curriculum. During these Spring 2015 focus groups, we asked students to list five pieces of advice they would give to a teacher about to teach introductory CS for the first time.

Although the responses shared by students touched on several different issues (outlier.uchicago.edu/basics/findings/student-advice), we found several consistent themes:
1. **Focus on the basics of teaching.** Almost half of the students (44%) gave advice related to the basic skills of teaching that apply to teaching any subject area. For example, students called out the importance of practicing good classroom management, providing clear and detailed instructions, varying the teaching and learning strategies, and starting with the content basics and reviewing along the way.

2. **Support your students in their learning.** Nearly a quarter (21%) of the student suggestions related to the importance of teacher support for students. Students specifically noted the importance of providing help, being patient with students as they learn, and creating a positive and supportive classroom environment.

3. **Know your students.** Students highlighted the value of knowing the students in your class (19%). For example, students identified the significance of teacher-student relationships that allow teachers to understand the needs of students and to appropriately pace the lessons.

4. **Motivate your students to learn.** Students also gave advice to teachers new to CS related to motivating students to learn (16%). Students described the importance of creating a fun and engaging class, making the course and content relevant to students’ lives, contextualizing what they learn in class, and challenging them.

These findings have implications that are twofold. First, for prospective and in-training CS teachers, these suggestions may help to alleviate the perception among those not already experienced in CS that they must be content experts to be effective. And second, for school leaders considering who within their current school staff could be trained to transition to teaching CS, these suggestions might guide their decision-making process.

Understanding what students value in their CS teachers is particularly helpful, given that growing the number of CS teachers is often identified as a critical barrier to growing CS overall ([cacm.acm.org/blogs/blog-cacm/198790-state-of-the-states-progress-toward-cs-for-all/fulltext](http://cacm.acm.org/blogs/blog-cacm/198790-state-of-the-states-progress-toward-cs-for-all/fulltext)), and that relatively few teachers currently have significant expertise in or experience teaching CS. In our study, we found that less than half (46%) of the participating teachers had majored in a STEM discipline (science, math, CS, or engineering), and of those, only about one quarter had majored in CS (outlier.uchicago.edu/basics/findings/ECSTeachers).

The good news is that what we heard from students was not about strong CS content expertise, but about comfort with the basic mechanics of teaching, support and thoughtfulness, and motivational skills. These student messages bode well for the many teachers crossing subject areas to begin teaching K–12 CS.

Student voices about CS are great additions to our knowledge for growing CS education. As we reach out to teachers feeling anxious about teaching this important subject area, we can tell them that what current CS students look for in a CS teacher is not just about the content. We can assure them that if they are a well-prepared and thoughtful teacher (in whatever subject area they already teach), then they already have many of the attributes that students value in a CS teacher.

The NSF Grant #1339256 supports this research.

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**MEET THE NEWEST CSTA STAFF**

Karen Wendling is the new Director of Business Development and Marketing for CSTA. She will be writing grants and working with the marketing collateral. Before joining CSTA, Karen was the Executive Director for March of Dimes of Northeastern New York. She led their fundraising efforts throughout the Northeast Region, while also handling the operations for their local office. She is married with two sons—one headed to college and one in middle school.

Marina Theodotou is the new Director of Professional Development. She will be leading CSTA’s PD offering for K–12 teachers, including the development and adoption of K–12 standards in Computer Science and building the Continuing Professional Development Pipeline. Marina is the founder of TEDxNicosia and a Bill & Melinda Gates Foundation Scholar-ship Laureate. She is pursuing a Doctorate in Education at the University of Southern California.
It’s been an amazing three-year journey for Fern Creek High School in Louisville, Kentucky, to grow from the bottom 10% of schools in the state to a computer science (CS) showcase. Even though I had previously retired from teaching, I was invited to join Fern Creek to start a CS Academy. The population of Fern Creek is extremely diverse, with students from Latin America, Africa, Nepal, and the Middle East. Many of their parents have limited English skills. In addition to these students, the population of Fern Creek includes a more traditional mix of urban poor and middle class, White and African-American students. A unique mix of younger, energetic and older, experienced teachers, all dedicated to a plan that revered in the diversity of students, was gathered.

The CS Academy started out with a small number of students, but was committed to providing a computer through a computer loaner program to any students who did not have one. We used the Microsoft Dreamspark program to make this happen by installing Windows software on donated computers.

In addition to the computer loaner program, I worked with the state to create a four-year CS curriculum, a first for the district. The program offers an introduction to CS for all advanced students in grade nine; other students start with a computer literacy course. A full-year Python class articulates with a course at the local community college. Students take Advanced Placement (AP) CS Principles during the junior year, and AP CS–A as seniors. We added an additional course, Introduction to Gaming Fundamentals, which also increased enrollment in the Academy.

Our program now includes a four-year curriculum, a gaming option that is supported by a series of five LAN party events each year, and a program to ensure students have access to a computer. Students also have access to a statewide Microsoft IT Academy (Imagine Academy). This program offers online curriculum and a curriculum support system. Our Academy has grown from 25 students to nearly 300. We have maintained standards-based rigor through the use of Precision Exams and Certiport/CompTIA exams. This gives us both pre- and post-course assessment data and industry-based certifications for our students.

Additionally, we’re collaborating with local colleges to increase student awareness of CS careers and educational opportunities. Twice a year we invite college CS departments to a “college day” afternoon. This provides students with the opportunity to talk to members from every university or college CS department within a hundred miles of our school.

Students also have the opportunity to interact weekly with a CS major through our College Mentors program. Our University of Louisville mentors advocate for CS during class visits. They talk with students about their CS course work, future CS educational, and career opportunities.

Another piece of this success puzzle has been our entry into the summer jobs market. We have modified the city-sponsored “Summerworks” high school jobs program to now include a “Summerworks IT/CS” program for our new cohort of summer workers.

With this scaffolding of opportunities and resources, our program has progressed from only two graduates going into post-secondary CS programs to 25 graduates entering CS programs in each of the last two years.

Teacher professional development, such as workshops and training sessions offered through CSTA, the University of Alabama, the College Board (CS Pilot program), and ISTE training opportunities, cannot be overlooked in preparing us for success.
OUT AND ABOUT THE COMMUNITY

VA LEADS IN CS EDUCATION

Chris Dovi

It’s been a defining year for Virginia (VA) as a national leader in computer science (CS) education. At a ceremony in June at the Franklin Military Academy, Gov. Terry McAuliffe signed the nation’s first law mandating CS education as a core academic requirement for all VA K–12 students.

The new requirements, which will be integrated into the VA Standards of Learnings (SOL), will not mean the addition of any new SOL tests. Since its founding, CodeVA has trained more than 800 teachers and impacted more than 100,000 students. A top priority with the legislation was ensuring that CS take its rightful and necessary place next to reading, writing, and math as an essential literacy taught to all students.

VA has done a great job placing more and more emphasis on STEM education, but none of these topics has included any CS coursework. Meanwhile, more than 70 percent of STEM-field jobs are CS jobs. Add to that the fact that VA has the highest concentration of CS jobs in the nation, adding CS to what kids learn in school is a matter of greatest urgency.

Next up with the legislation will be the VA Department of Education’s process of adopting new standards for CS that span all grade levels. CodeVA, which already had been active through its partner, Code.org, in the national CS curriculum framework adoption process, is also participating in the process.

Recent changes in leadership at the Department of Education, and the departure of VA Education Secretary Anne Holton, may have slowed the SOL adoption process a little bit, but the state remains on track to adopt standards over the next 12 to 18 months.

For students, these new standards likely won’t seem like that big of a deal. Our advice to the state for the past three years has been that the SOLs already are primed and ready for the integration of CS as a core topic. In many cases, teachers will be teaching the same things, but perhaps in new ways or with new vocabulary. As an example, in first grade, repeating patterns is already a required SOL objective. This lesson becomes essential CS knowledge with the addition of some important vocabulary such as loops. These sorts of lessons build on one another and lay the foundation for later, far more complex CS lessons that for most, if not all students, will include exposure to programming languages.

This is how we build the “New VA Economy” that Gov. McAuliffe talks about, and it’s how we ensure that our kids are as prepared as they can be for the modern job market.

CLASSROOM TOOLS

ACSL ADDS A NEW COMPETITION LEVEL

Carlen Blackstone

ACSL is an international competition that can significantly enrich your computer science (CS) program, either as part of an existing class, or as an extracurricular club. Because of the new Elementary Division, now any student in grades 3 through 12 can participate.

Twelve topics are taught throughout the school year, and tested in four locally-run contests between December and April. An invitational All-Star contest is held for the best teams in the Junior, Intermediate, and Senior Divisions over Memorial Day weekend.

ACSL has divisions tailored to all levels of student CS expertise. The new Elementary Division is a five-question test on a single new topic for each contest. The ACSL Classroom Division is a 10-question test on three to four new topics (no programming) for each contest. The Junior, Intermediate, and Senior Divisions include a five-question test on three topics and a take-home programming problem that can be written in any programming language.
All instructional materials will be provided at the time of registration. Elementary Division materials are designed to introduce teachers and students to cool CS concepts without assuming any prior background. ACSL will send, upon registration, a free CD with questions from previous years’ contests to all new advisors who are members of CSTA.

The new Elementary Division includes problems similar to these:

**Computer Number Systems**
What is the value of $456_{(8)}$ in hexadecimal?
Answer: $12E_{(16)}$

**Prefix/Infix/Postfix**
Evaluate the following postfix expression: $4 3 + 7 1 - * 2 /
Answer: 21

**Boolean Algebra**
What ordered pair makes the following TRUE?
(NOT A) AND (A OR B)
Answer: (0,1)

**Graph Theory**
How many cycles are in the undirected graph with 5 vertices {A, B, C, D, E} and 6 edges {AB, CD, BD, CE, AE, AD}? Answer: 6

Topics in the other divisions include Recursive Functions, What Does This Program Do?, Bit String Flicking, Lisp Programming, Data Structures, Assembly Language, Digital Electronics, and Regular Expressions. More information is available at: [www.acsl.org](http://www.acsl.org). Send questions to: info@acsl.org.