The Teacher Capacity Study sought to understand the experience, background, and contexts of the current high school computer science (CS) teaching community. Data was collected through a survey administered to the few known and accessible populations of computer science teachers including the Computer Science Teacher Association (CSTA) e-mail list. Please read the important information on study sample, duration and response rate.
WHO RESPONDED?

The survey asked about: (1) age; (2) gender; (3) number of years teaching; (4) number of years teaching computer science; (5) grades currently teaching; (6) degree level and type; (7) the number of undergraduate and graduate-level computer science courses taken; (8) department(s) they are associated with in their schools; and (9) number of years they have taught each computer science course they are currently teaching. The survey also asked about the respondents’ participation in the Computer Science Teachers Association, whether they collaborate with other colleagues on computer science teaching, and whether they have a leadership or advocacy role within their school or community.

▼AGE AND GENDER

RESPONDENTS WERE PREDOMINATELY IN THEIR 40’S AND 50’S AND A LITTLE OVER HALF WERE MALE. THIS IS RELATIVELY OLDER AND MORE MALE THAN THE GENERAL SECONDARY TEACHING POPULATION.

Survey respondents were 51% male and 48% female compared to the general secondary teaching population that is 42% male and 58% female. The population was also relatively older than the general teaching population with 62% of all respondents indicating they were between the ages of 41 and 60 compared to about 49% in the general teaching population.
THE VAST MAJORITY OF RESPONDENTS WERE CAUCASIAN.

The vast majority of respondents (81.7%) identified themselves as Caucasian, compared to 83.5% in the general high school teaching population. The next highest group was African-American/Black at 4% compared to the general teaching population at 6.7%.

YEARS TEACHING

MOST RESPONDENTS WERE EXPERIENCED TEACHERS AND HALF REPORTED TEACHING CS FOR TEN YEARS OR MORE. THE RESPONDENTS WERE RELATIVELY MORE EXPERIENCED THAN THE GENERAL SECONDARY TEACHING POPULATION.

The vast majority of respondents (87%) indicated they have been teaching for over six years, with about two thirds of those (61%) indicating they have been teaching for over ten years. The respondents appear to have been in the field relatively longer than the general teaching population at 37.2% stating they have taught 11-20 years compared to 27.3% of the general secondary teaching population that state they have been teaching 10-19 years. Of the teachers teaching at least ten years, 43% indicated that they had been teaching computer science for at least 10 years.

In contrast, 30% of respondents reported teaching computer science for five years or less. Individuals in this group were significantly less likely to report having sufficient curriculum materials, hardware, software, and assessment tools to teach their courses. This group was also significantly less likely to
report having sufficient content knowledge and training, teaching strategy knowledge and training, and assessment training.

**EDUCATION AND TRAINING**

CS EDUCATION AND TRAINING IS HIGHLY VARIED. THIRTY-FIVE PERCENT OF RESPONDENTS HAVE AN UNDERGRADUATE DEGREE IN COMPUTER SCIENCE, FIFTEEN PERCENT HAVE A GRADUATE DEGREE IN COMPUTER SCIENCE, AND SEVEN PERCENT HAVE BOTH.

**Undergraduate Degrees:** Thirty-five percent of respondents have an undergraduate degree in computer science, while 32% hold an undergraduate degree in mathematics. Twenty-six percent hold an undergraduate degree in education. Twenty-four percent had an undergraduate degree they described as “other.” “Other” degrees include business, foreign language, journalism, and marketing.

Thirty-four percent of respondents hold more than one undergraduate degree. Of those respondents, 31.2% hold degrees in both CS and mathematics, 21.3% hold degrees in both CS and education, and 21.7% hold degrees in both education and mathematics.

**Graduate Degrees:** Approximately three-fourths (74%) of respondents have a graduate degree compared to only 54% of teachers in the general secondary teaching population. Most of those graduate degrees are in education, followed by “other” with computer science the third highest response.

Of those with graduate degrees, nearly all (90%) reported having master’s degrees, 4% had more than a master’s degree but no doctorate, 6% had doctorate degrees (compared to the general teaching population with 1.6%) and 1% were identified as “other” (mostly graduate level certificates).

There was no relationship between years teaching overall and having a graduate-level degree in CS; nor was there a relationship between years teaching CS and having a graduate level degree in CS. However, those teaching CS for five years or less were significantly more likely to have an undergraduate degree in CS.
Nearly 13\% of all respondents reported that they had taken no undergraduate CS courses. This group had significantly more years teaching than those who reported taking at least one computer science course (11\%) as an undergraduate. About 15\% reported taking two courses. At the other end of the spectrum, almost a quarter of all respondents (22\%) said that they took 10 or more computer science courses during their undergraduate studies.
**Graduate Computer Science coursework:** Of the 74% of respondents with graduate degrees, 62% of those degrees were in education, and about 20% were in computer science. Further, of those with graduate degrees, 40% took no graduate level computer science courses; 12% took one computer science course and 11% took two. In contrast, fifteen percent reported taking 10 or more.

**Other Coursework:** When asked about how many computer science courses respondents took that were not part of a degree program, 42% indicated they had taken none, 33% indicated they took one to three other non-degree computer science courses, with the remainder taking four or more. Seven percent indicated taking 10 or more computer science courses that were not part of their degree program.

**▼ PREPARATION**

**OVERALL, RESPONDENTS FEEL PREPARED TO TEACH COMPUTER SCIENCE**

Most respondents agreed or strongly agreed that they had sufficient computer science content knowledge (75%), sufficient training in content areas (68%), sufficient knowledge of teaching strategies (72%), sufficient assessment tools (69%), and sufficient formal training in pedagogy (70%).

As expected, teachers with an undergraduate or graduate degree in computer science had significantly higher average ratings on the sufficiency of their content knowledge and content area training than those without a computer science degree. Further, those with a graduate degree in computer science had significantly higher average ratings on their assessment knowledge than those without a computer science degree.
During the questionnaire, respondents were asked to identify which courses they taught. They were specifically asked about APCS – A: Advance Placement Computer Science A; APCS: Principles – Advanced Placement Computer Science Principles; ECS: Exploring Computer Science; and “Other.” Some of the analysis included examining differences between teachers who identified themselves as teaching these courses.

More specifically, when looking at teachers of APCS: Principles, APCS-A, ECS and “other”:

**Age:** There is no significant relationship between teacher age and teaching APCS-A, APCS-Principles, ECS, or other.

**Years Teaching:** There was no significant relationship between years teaching overall and teaching a particular course. However, teachers teaching CS for 5 years or less teach significantly fewer “Other” courses than all other groups.

**Education and Training:** Those with CS undergraduate degrees are significantly more likely to teach AP-CS Principles, APCS-A, and ECS than teachers who do not have a CS undergraduate degree. There were no significant relationships between CS undergraduate degrees and teaching “Other” courses. Furthermore, there were no significant relationships between having a CS graduate degree and teaching any particular course. However, those with CS degrees (both undergraduate and graduate) are **significantly more likely** to report sufficient content knowledge to teach their courses. Similarly, respondents with undergraduate degrees in education reported significantly lower ratings on the sufficiency of training and professional development in content areas and content knowledge than those without undergraduate degrees in education.

**Preparation:** APCS: Principles and APCS-A teachers reported **significantly higher** ratings on the **sufficiency of their content knowledge** than ECS & ‘Other’ course teachers;

APCS-A teachers reported a **significantly higher** ratings on the **sufficiency of their content area training** than APCS: Principles, ECS, & ‘Other’ course teachers.

APCS-A and ‘Other’ teachers reported a **significantly higher** ratings on the **sufficiency of their teaching strategy knowledge** than APCS: Principles & ECS course teachers; and
APCS-A, APCS: Principles, and ‘Other’ teachers reported a **significantly higher** ratings on the **sufficiency of their assessment knowledge** than ECS teachers.

There were no significant differences between teachers of these courses on ratings of sufficiency of formal training in pedagogy.

**How likely are respondents to agree that they have sufficient…..**

<table>
<thead>
<tr>
<th>Curriculum Materials</th>
<th>LESS LIKELY</th>
<th>NEITHER MORE NOR LESS LIKELY</th>
<th>MORE LIKELY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware</td>
<td></td>
<td>ECS</td>
<td>APA APA</td>
</tr>
<tr>
<td>Assessment Tools</td>
<td>ECS</td>
<td>OTH</td>
<td>APP APA</td>
</tr>
<tr>
<td>Software</td>
<td>ECS</td>
<td>OTH</td>
<td>APP APA</td>
</tr>
</tbody>
</table>

**APP** APCS Principals **APA** APCS-A **ECS** Exploring Computer Science **OTH** Other
WHERE ARE THEY?

The survey asked for respondents’ state, community type, and school size.

▼STATE

THE SURVEY HAD RESPONDENTS FROM ALL OF THE 48 CONTINENTAL UNITED STATES AND WASHINGTON, DC. THERE WERE NO RESPONDENTS FROM ALASKA OR HAWAII.

The five states with the largest number of respondents were five of the eight most populous states: Texas (9%), California (8%), Georgia (8%), New York (7%) and Pennsylvania (6%).
COMMUNITY

Almost half of respondents teach in suburban schools. Overall, the respondents’ communities were relatively more suburban and less urban and rural than the general secondary teaching population. Just under half of the respondents (49%) reported teaching at schools in suburban settings, compared to 36% of the general secondary teaching population. Further, 23% reported teaching in urban schools, compared to 27% in the general population and 10% reported teaching in rural schools compared to 22% of the general teaching population. Fourteen percent of respondents also reported teaching in small city/town schools, which was comparable to the general secondary teaching population.

SCHOOL SIZE

The sizes of respondents’ schools vary widely, but appear to be relatively larger than schools across the nation. Survey respondents reported school sizes anywhere from 51 students to more than 2000 students, however almost half of the respondents’ schools (48%) are between 501 and 1500 students. According to NCES, about 45% of regular secondary schools (over grade 7) have enrollments under 500. Sixteen percent of survey respondents reported being in schools with populations under 500. Likewise, 24% of respondents reported being in schools with 1001-1500 students compared to schools across the nation at 13.4%. Finally, 16% of respondents reported having 2000 or more students compared to schools across the nation at 7.7%.
Further, schools that offer **APCS-A are significantly larger** than schools that don’t offer APCS-A, while **schools that offer “other CS courses”** are significantly smaller than those that don’t. There are a several possible explanations for this including: 1) larger schools have more students and may simply have sufficient numbers to fill classroom seats; 2) there may be more interest at the larger schools in an APCS-A courses; 3) the larger schools may have more available staff teach APCS-A; or 4) it may be a combination of these or other factors.

The survey asked respondents to indicate whether computer science is the primary subject they teach, the percentage of time they teach computer science, and if there are any other computer science teachers at their school.
WHAT ARE THEIR SCHOOL CONTEXTS?

▼ COMPUTER SCIENCE TEACHING SITUATION – ALONE OR WITH OTHERS

MORE THAN HALF OF RESPONDENTS REPORTED BEING THE SOLE COMPUTER SCIENCE TEACHER AT THEIR SCHOOLS.

Fifty-five percent of respondents reported being the only computer science teacher in their schools. This includes respondents in both full time and part time positions.

▼ COMPUTER SCIENCE TEACHING SITUATION – FULL OR PART TIME

THE MAJORITY OF THE RESPONDENTS ARE FULL TIME TEACHERS, BUT NOT FULL-TIME COMPUTER SCIENCE TEACHERS.

The majority (92%) of respondents reported being full-time teachers but only 35% of respondents reported being full-time computer science teachers.
Thirty-five percent of the total respondents \((n=274)\) identified themselves as full-time computer science teachers. Of this 35%, nearly half (48%) reported having no other computer science teachers at their school; about a quarter reported having at least one other full-time computer science teacher at their school; and 10% reported having at least one part-time computer science teacher colleague. 20% of these respondents \((n=55)\) reported having both, at least one part-time and one full-time computer science teacher colleague. Even with this sample that may potentially be exemplary or more motivated than the general population of CS teachers across the nation, we see that only about a third of these teachers are full time computer science teachers.

Full-time computer science teachers are no more likely to teach APCS-A or APCS-Principles or ECS than teachers in other categories. However, they are more likely to teach “other computer science courses” including office productivity/business applications, database management, networking, game development, introduction to computer science (not ECS) and advanced computer science (not AP) than part-time computer science teachers.

\[\text{▼ PRIMARY SUBJECT TAUGHT}\]

**OVER TWO-THIRDS OF RESPONDENTS REPORTED TEACHING COMPUTER SCIENCE AS THEIR PRIMARY SUBJECT. THE NEXT MOST FREQUENTLY REPORTED PRIMARY SUBJECT TAUGHT WAS MATHEMATICS.**

The teachers primarily teaching computer science courses reported spending 82% of their time teaching computer science. On the other hand, the teachers primarily teaching non-computer science courses reported spending only 33% of their time teaching computer science.

Sixty-eight percent of respondents reported teaching computer science as their primary subject, while 32% did not. This is quite different than the best estimates of the general secondary teaching population. The Condition of Education survey doesn’t ask about computer science as a primary subject so the best estimate is that those who identify as teaching primarily computer science are part of the 16.1% who responded “other” in that survey. The proportion of those who identified mathematics as their primary subject in this survey was closer to the general population, but still higher at 18% compared to 14.3%.

Of those whose primary subject is not computer science 58% are mathematics teachers, and 15% are business teachers. All other subjects reported as “primary” subjects each comprised less than 5% of the total.
TEACHERS WHO TEACH COMPUTER SCIENCE AS THEIR PRIMARY SUBJECT ARE MOSTLY AFFILIATED WITH THE COMPUTER SCIENCE OR CTE DEPARTMENTS WITHIN THEIR SCHOOLS. TEACHERS WHO TEACH COMPUTER SCIENCE, BUT NOT AS THEIR PRIMARY SUBJECT, ARE MOSTLY AFFILIATED WITH THE MATHEMATICS DEPARTMENTS IN THEIR SCHOOLS.

In What Department do Respondents Reside at their School?

Over one third of respondents report no collaboration on CS with colleagues. Of those who do collaborate, most report working with colleagues in their schools.

Thirty-six percent of respondents report that they do not collaborate with colleagues on CS. Of the sixty-four percent of respondents who do collaborate on CS, they mostly collaborate (60%) with colleagues in their schools. About half (51%) collaborate with colleagues in their district/local school communities and 42% collaborate with their local professional community. A little over a third (36%) collaborate with their national professional community, and 9% collaborate with “others.”

Not surprisingly, computer science teachers who are alone in their schools are less likely to find collaborators in their own schools, district/local school community, local or national professional communities and are more likely to find collaborators in “other” sources (many of these are with friends in industry, previous colleagues, or the internet).
**CSTA MEMBERSHIP**

**OVER 80% OF RESPONDENTS ARE MEMBERS OF CSTA AND ONE-THIRD OF THOSE RESPONDENTS REPORTED PARTICIPATING IN THEIR LOCAL CHAPTERS.**

Eighty-three percent of respondents are CSTA members and of these, 34% participate in their local chapters. It is not known what percentage of the national population of CS teachers are members of CSTA. Members of CSTA local chapters are statistically more likely to collaborate with other colleagues, to hold computer science leadership positions in their school/district/community, and play computer science advocacy roles.

**LEADERSHIP AND ADVOCACY ROLES**

**FORTY-THREE PERCENT OF SURVEY RESPONDENTS REPORTED HAVING A LEADERSHIP ROLE PERTAINING TO CS AND A VAST MAJORITY (87%) OF RESPONDENTS REPORTED HAVING AN ADVOCACY ROLE FOR COMPUTER SCIENCE.**

The top reported leadership role was Head of Department.

Respondents most often reported advocating to school, district, or state leaders.
WHAT ARE THEY TEACHING?

The survey asked respondents to report on the computer science courses and topics they are currently teaching.

▼MOST COMMON COURSES

ALMOST TWO THIRDS OF RESPONDENTS (61%) TEACH AT LEAST ONE OF THE FOLLOWING: APCS-PRINCIPLES, APCS-A, OR ECS, AND 38% TEACH “OTHER” COURSES ONLY.

Among the group of teachers who teach APCS-A, APCS-Principles, and ECS (and possibly “other”), AP Computer Science A was the course most often reported taught. It was reported taught by 52% (n=406) of all respondents. Of those, 59 (7.6%) only teach APCS-A.

In contrast, about 19% of all respondents (n=146) reported teaching APCS Principles. Of the 19%, only 25 (or 17%) reported teaching only APCS Principles; 98 (or 67%) reported teaching APCS Principles and APCS A; only 7 (5%) report teaching AP CS Principles and ECS; and 16 (11%) teaching all three (AP CS Principles, AP Computer Science A and ECS).

Similarly, 9% (n=72) of all respondents reported teaching ECS, with 37 (51%) teaching ECS only; 12 (17%) teaching AP Computer Science A and ECS and the rest in combinations reported above.
COURSE OFFERINGS ARE WIDELY VARIED. A LARGE MAJORITY (86%) OF RESPONDENTS REPORT TEACHING “OTHER” COMPUTER SCIENCE COURSES. AND OF THESE, ABOUT HALF CHARACTERIZE THE “OTHER” COURSE AS “OTHER.”

Of the 86% of respondents who reported teaching “other” courses, 39% (n=260) reported teaching “other” courses only. This suggests that 34% of all respondents teach “other courses only,” which are not defined in this study.

Of the “other” courses, most (58%) reported teaching Introduction to Computer Science (not ECS). Other courses also included Office Productivity/Business Applications (30%); Advanced Computer Science (34%); Game Development (24%); Networking (10%) and Database Management (8%). Just under half (49%) of those who teach “other courses” (n=331) teach courses that did not fall into one of the provided categories and opted for “other.” This “other – other” category potentially reflects the wide range of courses taught and the associated incoherence of courses in the computer science field.
Other—“other” courses (taught by 49.5% of respondents) included web design, robotics, computer illustration and graphic design and many of them were simply identified as “programming.”

▼ GENDER, AGE, YEARS OF TEACHING, AND COURSES


Further, there is no significant relationship between either years of teaching or years of teaching computer science and teaching a particular CS course with one exception. The exception is that teachers teaching five years or less were significantly less likely to teach “other” courses than teachers in other age groups.

▼ HIGHER EDUCATION AND COURSES

AP CS PRINCIPLES, AP COMPUTER SCIENCE A AND ECS HAVE A SIGNIFICANTLY HIGHER PROPORTION OF TEACHERS WHO HAVE A DOCTORATE (IN ANY SUBJECT) THAN “OTHER” COMPUTER SCIENCE COURSES.

More specifically, while 19% of all respondents teach AP CS Principles, 42% of respondents with a doctorate degree reported teaching AP CS Principles. Similarly, while 52% of the total respondents reported teaching APCS-A, 75% of those with a doctorate report teaching APCS-A. Further, while 9% of the overall population report teaching ECS, 24% of those with a doctorate report teaching ECS.
RESPONDENTS INDICATE THAT APCS-A COURSES RESIDE PRIMARILY IN MATHEMATICS DEPARTMENTS; APCS PRINCIPLES COURSES AND ECS COURSES RESIDE PRIMARILY IN COMPUTER SCIENCE DEPARTMENTS.

ECS courses are distributed across Computer Science (54%), CTE (35%), Vocational (32%), Business (32%) and Mathematics (14%) departments.

APCS-Principles courses are distributed across Computer Science (41%), CTE (34%), Mathematics (33%), and Business (20%).

APCS-A courses are distributed across Mathematics (45%), Computer Science (29%), CTE (26%), and Business (15%).

A greater proportion of APCS-A courses reside in mathematics departments than computer science departments, while a greater proportion of APCS-Principles and ECS reside in computer science departments.
COMMON TOPICS TAUGHT WITHIN COURSES

OVER HALF OF RESPONDENTS REPORTED TEACHING THE TOPICS: INTRODUCTORY PROGRAMMING, ADVANCED PROGRAMMING, AND COMPUTATIONAL THINKING/PROBLEM SOLVING.

Across all courses taught, the vast majority of respondents reported teaching Introductory Programming (81%), with the following also reported as popular topics: Advanced Programming (62%), Computational Thinking/Problem Solving (53%), Logic, Ethical and Social Issues* (48%), Web Design/Development (45%), Computer Applications (37%), Game Development (34%), Computer Graphics (30%), Networking/Databases (22%), Computer Architecture/Systems (18%), Computer Security (16%), and “Other” (18%).

*Due to a keyboarding error, “Logic” was mistakenly grouped with “Ethical and Social Issues”

AP CS Principles teachers are statistically more likely (than teachers who don’t teach AP CS Principles) to teach Advanced Programming, Networking, and Computer Security.

AP Computer Science A teachers are statistically more likely (than teachers who don’t teach AP computer science A) to teach Advanced Programming, Computational Thinking, and Logic, Ethical and Social Issues and they are statistically less likely to teach Web Design/Development, Game Development, Networking/Databases, Computer Graphics, and Computer Applications.

ECS teachers are statistically more likely to teach all topics except Introductory Programming and Other and they are statistically less likely to teach Advanced Programming.

“Other” teachers were statistically more likely to teach Web Design/Development, Game Development, Networking/Databases, Computer Graphics, Computer Applications, and Other.
Teachers of ECS were significantly more likely than APCS-A and APCS-Principles teachers to teach every topic except Introductory Programming (ECS was neither more or less likely) and Advanced Programming (less likely). APCS-A teachers were significantly less likely to teach a range of topics except Introductory Programming (neither more or less likely) and more likely to teach Advanced Programming, Computational Thinking and Problem Solving, and Ethics, Logic and Social Issues. APCS-Principles was most often in the “Average” category except for Advanced Programming, Networking, and Computer Security where it was “more likely.”
SUBURBAN SCHOOLS ARE MORE LIKELY TO OFFER AP COMPUTER SCIENCE A THAN SCHOOLS IN OTHER COMMUNITIES. THERE WERE NO OTHER SIGNIFICANT ASSOCIATIONS BETWEEN COMMUNITY TYPE AND COURSES TAUGHT.
WHAT RESOURCES DO THEY HAVE?

The survey asked respondents if they had sufficient curriculum materials, hardware, assessments and software.

▼ RESOURCES

MOST RESPONDENTS FELT THEY HAD SUFFICIENT RESOURCES TO TEACH COMPUTER SCIENCE.

Sixty percent of respondents agreed or strongly agreed that they had sufficient curriculum materials and other instructional resources, while 21% somewhat agreed and 20% either somewhat disagreed, disagreed or strongly disagreed.

Sixty-six percent of respondents agreed or strongly agreed that they had sufficient hardware, while 19% somewhat agreed and 15% either somewhat disagreed, disagreed, or strongly disagreed.

Fifty-four percent of respondents agreed or strongly agreed that they had sufficient assessment tools, while 25% somewhat agreed and 21% somewhat disagreed, disagreed or strongly disagreed.

Sixty-six percent of respondents agreed or strongly agreed that they had sufficient software, while 16% somewhat agreed, while 18% either somewhat disagreed, disagreed or strongly disagreed.

APCS Principles and APCS-A teachers were more likely than all other respondents to say they had sufficient curriculum materials, assessment tools and software.

ECS teachers were less likely than all other respondents to say they had sufficient assessment tools and software.

From a community perspective, teachers in rural settings were significantly less likely to report having sufficient hardware, software, curriculum materials, and assessment tools than all other respondents. Further, from the perspective of years teaching, having sufficient materials and preparation were more closely correlated with years of CS teaching than years teaching overall, except for sufficient training in teaching strategies.
Looking at this data overall, about 2/3 of respondents agree or strongly agree that they have sufficient resources across most materials, however, less than half agree that they have sufficient assessment tools.

There was no significant relationship between the reported importance of computer science (from the point of view of stakeholder audiences, see more below) and the sufficiency of resources.

**How likely are respondents to agree that they have sufficient…..**

<table>
<thead>
<tr>
<th></th>
<th>LESS LIKELY</th>
<th>AVERAGE</th>
<th>MORE LIKELY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum Materials</td>
<td>ECS OTH</td>
<td>ECS OTH</td>
<td>APP APA</td>
</tr>
<tr>
<td>Hardware</td>
<td></td>
<td>APA APP ECS OTH</td>
<td>APP APA</td>
</tr>
<tr>
<td>Assessment Tools</td>
<td>ECS</td>
<td>OTH</td>
<td>APP APA</td>
</tr>
<tr>
<td>Software</td>
<td>ECS</td>
<td>OTH</td>
<td>APP APA</td>
</tr>
</tbody>
</table>

▼PROFESSIONAL DEVELOPMENT

RESPONDENTS INDICATED THEY WOULD MOST LIKELY PARTICIPATE IN PROFESSIONAL DEVELOPMENT ON GAME DEVELOPMENT, ADVANCED PROGRAMMING, AND COMPUTATIONAL THINKING/PROBLEM SOLVING IF GIVEN THE OPPORTUNITY.
APCS Principles teachers reported they were more likely to attend professional development for advanced programming than teachers of other courses.

APCS-A teachers reported they were less likely to indicate they would participate in professional development on introductory programming, web design/development, and computer applications, but were more likely to participate in professional development in “Other” topic areas.

There were no significant associations between any PD topics and respondents teaching ECS or Other courses.

Teachers with fewer years of teaching experience were more likely to indicate they would participate in professional development on introductory programming, advanced programming, and logic, ethical and social issues.

Respondents who reported primarily teaching computer science were more likely to indicate they would participate in professional development for computer security than those who do not primarily teach computer science.

Teachers who reported they were the only computer science teacher at their school were more likely to indicate that they would participate in professional development for advanced programming, game development, and computational thinking/problem solving than other topics.
WHAT ARE SUPPORTS AND BARRIERS TO TEACHING COMPUTER SCIENCE?

The survey asked respondents to describe the extent to which the school leadership, district leaders, parents and community leadership value computer science; whether there is enough student demand for computer science within their school; and whether or not there are logistical barriers to students taking computer science at their schools.

▼ STAKEHOLDER IMPORTANCE

RESPONDENTS REPORTED HAVING STAKEHOLDERS WHO THINK CS IS IMPORTANT.

A large majority of respondents (85%) agreed (somewhat agreed, agreed or strongly agreed) that their school leadership thinks offering computer science is important. 25% “strongly agreed.”

About three quarters (77%) agreed (somewhat agreed, agreed or strongly agreed) that their district leadership thinks offering CS is important. 16% “strongly agreed.”

A large majority of respondents (86%) agreed (somewhat agreed, agreed or strongly agreed) that that parents and community leadership thinks offering CS is important. 19% “strongly agreed.”

Almost as many (79%) agreed (somewhat agreed, agreed or strongly agreed) that there is student demand for computer science courses. 20% “strongly agreed.”

There is no significant correlation between community type (urban/rural/suburban) and perceptions of stakeholders thinking computer science is important with one exception. Teachers from urban areas had significantly lower ratings than teachers in other communities when asked whether the district leadership thinks offering computing/computer science courses is important.

Further, there is a significant positive relationship between reported stakeholder importance of all kinds and student demand. Thus, it is possible that when adult populations around students demonstrate belief in the importance of computer science the students demand more CS for themselves. Or, it’s also possible that when adults focus on importance of computer science, students begin to demand it more.

There was no significant relationship between years teaching CS and perceived support from school or district leadership, and parents and community. There was also no significant relationship between years teaching CS and perceived student demand or the perception that there are few logistical barriers between students and enrollment in CS courses.

Of course, quantitative analysis only tells part of the story. Click here to see more comments that the respondents made about their stakeholders.
A Focus on Coherence is Key.
Computer science courses are enormously varied even when accounting for the presence of APCS-A, APCS Principles and ECS. Thus, any effort to improve computer science on a national scale faces the operational challenge of communicating clearly about the goals for computer science education as a whole and identifying the presence of those goals in these widely varied courses.

Varied Teacher Audiences Will Call for Varied Strategies.
The respondents to this survey appear to be an elite group of CS teachers. They are relatively educated in CS, motivated, experienced, primarily identify as computer science teachers, and teach in an environment where CS is considered important. Seeing this, it is important to recognize that this population is different than the potential computer science teaching population that may be less prepared, less experienced, and have more limited advocates and support. Each will require related, but likely different strategies.

Multiple Entry Points are Necessary.
Computer science courses reside in a wide variety of high school departments. Likewise, courses are taught by teachers who reside in a variety of departments. Thus, strategies for improving computer science instruction will require multi-faceted approaches and engagement of multiple groups who advocate for the teachers and content of these departments.

Consider the Implications of Topics Taught in each Course.
Topic focus varies significantly with each course. The distribution of reported topics taught in each APCS-A, APCS-Principles, and ECS varies significantly. While ECS is intentionally at one end of a spectrum with an emphasis on significantly wider range of topics than the others and APCS-A is at the other end, with an emphasis on significantly smaller range of topics than the others, APCS-Principles appears to be finding middle ground with average emphasis on a wider range of topics.

Growing Computer Science Education Communities May Help.
83% of respondents were CSTA members and many of them reported themselves as being in advocacy and leadership roles. This is consistent with the perception that these are a somewhat elite sample of teachers. At the same time, many reported isolation and relative lack of collaboration regarding their CS teaching. More opportunities for collaboration with others can strengthen the overall effort to improve computer science.

Implementation Studies are Needed.
The respondents to this survey who we believe to be a relatively elite group indicate they have the tools, knowledge and support they need, though there are lower ratings of CS assessment sufficiency. Studying implementation and outcomes would shed considerable light on what computer science education actually looks like in these and other classrooms and the extent to which they reflect the intentions of APCS- Principles and CS education leaders.
Under the direction of the Association for Computing Machinery (ACM), in partnership with the Computer Science Teachers Association, Google, Microsoft, the National Center for Woman and Information Technology, and the National Science Foundation.

Funding provided by Google