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# Computer Science Learning: Closing the Gap
## Rural and Small-Town School Districts

Computer science (CS) education prepares students for future opportunities and challenges across every discipline, from business to fashion to agriculture science. Students in the U.S., regardless of what type of community they live in, value CS and see it as important for their future careers, including 86% of rural and small-town students who say they are somewhat or very likely to have a job where they would need to know CS. This summary highlights the CS education disparities for rural and small-town communities, based on nationally representative surveys from 2015-16.
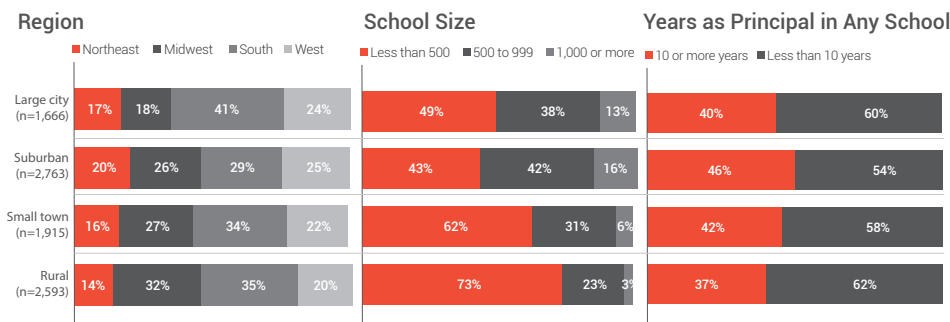
## Survey Population Groups
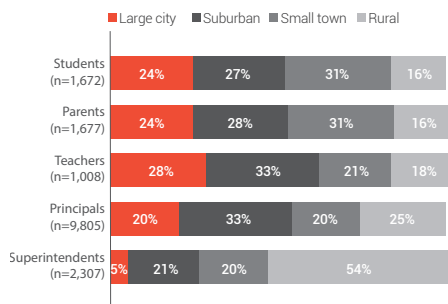


## Background

Residents in rural areas in the U.S. lag behind urban residents in overall educational attainment,[1] potentially limiting exposure to CS learning during higher education. Fewer than two in 10 adults (19.5%) aged 25 or older living in rural areas have a bachelor's degree, compared with 29% living in urban areas.[2] Furthermore, fewer rural residents (81%) use the internet than do urban (89%) or suburban (90%) residents.[3] With fewer rural residents completing college and using the internet, exposure to CS learning during K-12 and informal learning settings is especially important.
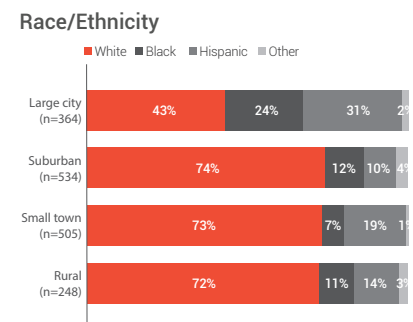
Rural populations are growing at a faster rate than urban populations in many parts of the country. While rural communities tend to be less racially diverse than urban communities — 78% of rural America is white compared with 64% nationally[4] — their populations are growing increasingly diverse in terms of race, background and disabilities.[5] Poverty rates in rural communities in the U.S. are also on the rise,[6] and median household incomes are lower than in urban communities ($52,386 vs. $54,296, respectively).

This summary highlights the challenges and opportunities for CS education in rural and small-town school districts in the U.S., which make up nearly half of the U.S. student population. Respondents were asked to identify the type of school district they were associated with — rural, small town, suburban or large city. This report combines data for rural and small-town residents due to sample size limitations.

## Principal responses

### Region



### School Size



### Years as Principal in Any School



## Student responses

### Race/Ethnicity

1  ACS Report 2017 (combined data from 2011-2015), cited here: https://www.ers.usda.gov/topics/rural-economy-population/employment- education/rural-education/
2  https://www.census.gov/newsroom/press-releases/2016/cb16-210.html
3  http://www.pewinternet.org/fact-sheet/internet-broadband
4  2010 Census referenced in http://www.ruralhome.org/storage/research_notes/rrn-race-and-ethnicity-web.pdf
5  http://www.ruraledu.org/user_uploads/file/2013-14-Why-Rural-Matters.pdf
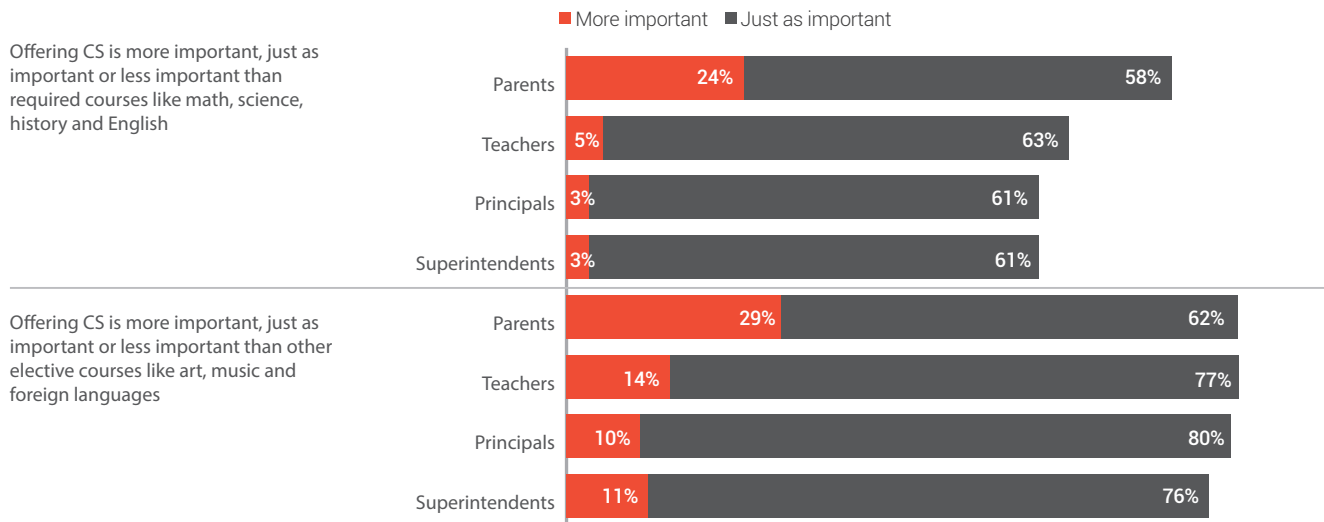6  Ibid.

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## Findings

### Support for CS

Students, parents and educators in rural or small-town school districts value CS highly, similar to those living in large cities and suburbs. **Students** in rural or small-town school districts are just as likely as students in large-city and suburban school districts to:

- Say they will have a job someday where they need to know some CS (30% very likely, 56% somewhat likely)
- Agree that CS can be used in a lot of different types of jobs (96%)
- Say they are interested in learning CS (24% very interested, 58% somewhat interested)

**Parents, teachers, principals** and **superintendents** in rural or small-town school districts think offering CS learning opportunities in school is just as important or even more important than offering elective courses, such as art, music and foreign languages, and required courses, such as math, science, history and English.

### VALUE OF CS AMONG SMALL-TOWN/RURAL POPULATIONS



Legend: ■ More important  ■ Just as important

Offering CS is more important, just as important or less important than required courses like math, science, history and English

| | More important | Just as important |
|---|---|---|
| Parents | 24% | 58% |
| Teachers | 5% | 63% |
| Principals | 3% | 61% |
| Superintendents | 3% | 61% |

Offering CS is more important, just as important or less important than other elective courses like art, music and foreign languages

| | More important | Just as important |
|---|---|---|
| Parents | 29% | 62% |
| Teachers | 14% | 77% |
| Principals | 10% | 80% |
| Superintendents | 11% | 76% |

While most parents from rural or small-town districts think it is important to offer CS in schools, only 27% of these parents say they have specifically expressed support for CS classes to a teacher or other school official. This is on par with parents from large-city and suburban districts. Furthermore, principals from rural and small-town schools (53%) are more likely than principals from large-city (46%) and suburban (41%) schools to say parent demand for CS is low.

**Principals** from rural or small-town districts are just as likely as principals from large-city and suburban schools to agree that:

- It is a good idea to incorporate CS into other subjects at school (70%)
- Demand for CS among students is high (13%)

However, compared with principals from suburban and large-city schools, **principals** from rural or small-town districts are:

- Less likely to say CS is a top priority in their school (23% of rural or small-town, 30% of large-city and suburban)
- Less likely to say their school board thinks it is important to offer CS (35% rural or small-town, 40% large-city and 45% suburban)
- Less likely to believe students should be required to learn CS (58% rural or small-town, 66% large-city and 63% suburban)
- Less likely to say participation in CS opportunities has increased in the last three years (among principals that offer CS learning opportunities — 54% rural or small-town, 60% large-city and 68% suburban)

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Similar to suburban and large-city schools, the top barriers that **principals** from rural or small-town districts cite for not having CS learning opportunities are:

- A lack of teachers available at the school with the necessary skills to teach computer science (64%)
- A lack of money to train or hire teachers (56%)
- A need to devote most of their time to courses related to testing requirements, and computer science is not one of them (52%)

## Access and Exposure to CS and Tech

Compared with principals from suburban schools, **principals** from rural or small-town and large-city schools are:

- Less likely to have CS classes (58% of rural or small-town, 57% large-city and 65% suburban).
- Less likely to have clubs in their school (47% rural or small-town, 59% large-city and 65% suburban)
- Less likely to say they have courses that specifically teach coding (37% rural or small-town, 41% large-city and 49% suburban)
- Less likely to have advanced-placement CS courses (8% of rural or small-town 9% of large-city and 12% of suburban)

While students from rural or small-town school districts are just as likely to be exposed to computers at school and at home, **parents** from rural or small-town districts are:

- Less comfortable with computers and technology than parents from suburban or large-city districts (37% "very comfortable" in rural or small-town districts, 49% in large-city and 47% in suburban)
- Less likely to be aware of opportunities to learn CS in the community outside of school (37% rural or small-town, 43% large-city and 54% suburban)

Since parents who live in rural or small-town districts are less likely to be aware of or have access to opportunities to learn CS outside of school, students in rural areas may be less likely to participate in these opportunities. Along with less frequent access to CS in their schools, students in rural or small-town districts may be less likely to learn CS outside of school.

## Recommendations

Our findings highlight the need to understand the unique challenges of each rural community. While students, parents and educators in rural and small-town communities value CS education highly, these areas face unique demographic, economic and institutional challenges. Distances are greater, and places are more isolated. Advantages derived from businesses and services clustering together are limited. As a result, programs to reform education may affect rural people and communities differently than those in larger metropolitan areas.[7] Additionally, despite the fact that nearly 20% of the U.S. population lives in rural areas, only 6% to 7% of charitable giving from 2005 to 2010 directly benefited rural areas.[8] With distinct challenges among each rural community, advocates should customize their approaches accordingly.

- **Leverage the high opinion of CS** that many key stakeholders already have to gather input, build collaboration between the public and private sectors, and broaden support for CS education, especially among parents, teachers and school-board members.
- **Strengthen mechanisms and support for teachers** who are particularly hard to recruit to rural or small-town areas through individualized approaches to help recruit and train those who can teach CS.[9] Support creative ways for teachers to overcome challenges of small numbers of students and increase foundational learning for CS, such as advanced math.
- **Build sustainable CS education** in rural communities through interaction with and integration of local, national and global partners, resources and funding. With local partners, increase awareness of CS careers in rural areas, e.g., applications in healthcare, education, agriculture and government.

7  http://www.salon.com/2017/02/26/rural-america-broadens-our-economic-intellectual-cultural-diversity-we-cant-ignore-its-residents_partner/
8  https://www.insidephilanthropy.com/science-education/2016/7/29/this-corporate-funder-is-prioritizing-stem-shortfalls-in-rur.html?rq=rural
9  http://hechingerreport.org/as-the-race-to-expand-stem-education-enters-its-next-lap-here-are-three-ways-to-recruit-and-train-more-teachers/

# Computer Science Learning: Closing the Gap
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### Data Tables

Google commissioned Gallup to conduct a multiyear, comprehensive research effort to better understand CS perceptions, access and learning opportunities among underrepresented groups in the U.S. Results are from Year 2 of this study of U.S. students, parents, teachers, principals and superintendents. The below data tables show summaries of responses from representative samples of 1,672 7th–12th-grade students and 1,677 parents of 7th–12th graders in the U.S., as well as 9,805 K-12 principals and 2,307 superintendents, surveyed 2015–16. Sample sizes may vary by question. See g.co/csedurosearch for methodology in the full *Trends in the State of Computer Science in U.S. K-12 Schools* report.

| STUDENTS | Rural/Small town (n=753) | Large city (n=364) | Suburban (n=534) |
|---|---|---|---|
| Computer science can be used in a lot of different types of jobs. (% agree) | 96 | 95 | 99 |
| How interested are you in learning computer science in the future? (% very interested/somewhat interested) | 24/58 | 29/55 | 25/55 |
| How likely are you to have a job someday where you would need to know some computer science? (% very likely/somewhat likely) | 30/56 | 32/55 | 28/57 |

| PARENTS | Rural/Small town (n=713) | Large city (n=394) | Suburban (n=546) |
|---|---|---|---|
| Have you expressed support for computer science education to a teacher or another school official IN THE LAST 12 MONTHS? (% yes) | 27 | 32 | 27 |
| How comfortable are you with computers and technology? (% very comfortable) | 37 | 49 | 47 |
| As far as you know, are there opportunities in your community for your child to learn computer science outside of his/her school? (% yes) | 37 | 43 | 54 |

| PRINCIPALS | Rural/Small town (n=4,483) | Large city (n=1,652) | Suburban (n=2,750) |
|---|---|---|---|
| Which of the following best describes the demand for computer science education among parents in your school? (% low demand) | 53 | 46 | 41 |
| Which of the following best describes the demand for computer science education among students in your school? (% high demand) | 13 | 18 | 19 |
| Computer science education is currently a top priority for my school. (% strongly agree/agree) | 6/17 | 10/20 | 10/21 |

| PRINCIPALS | Rural/Small town (n=4,483) | Large city (n=1,652) | Suburban (n=2,750) |
|---|---|---|---|
| It is a good idea to try to incorporate computer science education into other subjects at school. (% strongly agree/agree) | 34/36 | 42/32 | 38/37 |
| Most students should be required to take a computer science course if it is available in their school. (% strongly agree/agree) | 29/30 | 30/36 | 34/29 |
| My school board is committed to offering computer science in our schools. (% strongly agree/agree) | 15/20 | 18/22 | 22/24 |
| For each of the different computer science classes available in your school this year, how many are? (% one or more) | | | |
| Introductory level | 55 | 54 | 61 |
| Advanced Placement (AP) courses | 8 | 9 | 12 |
| Another type of course | 13 | 13 | 15 |
| NET ANY CS Class | 58 | 57 | 65 |
| Approximately how many school-sponsored clubs or after-school activities that expose students to computer science are available to students in your school? (% one or more) | 47 | 59 | 65 |
| Do the computer science opportunities offered in your school include: Computer programming or coding to create things such as websites, apps, or video games? (Asked only of those with CS classes) (% yes) | 43 | 49 | 59 |
| Has participation in opportunities to learn computer science in your school increased, stayed about the same, or decreased in the last three years? (% increased) | 54 | 60 | 68 |
| As far as you know, why doesn't your school/your district offer any ways to learn computer science? (Asked only of those with no CS) | | | |
| There are no teachers available at my school/in my district with the necessary skills to teach computer science. | 64 | 65 | 63 |
| There is not enough money to train or hire a teacher. | 56 | 59 | 51 |
| We have to devote most of our time to other courses that are related to testing requirements, and computer science is not one of them. | 52 | 52 | 51 |

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