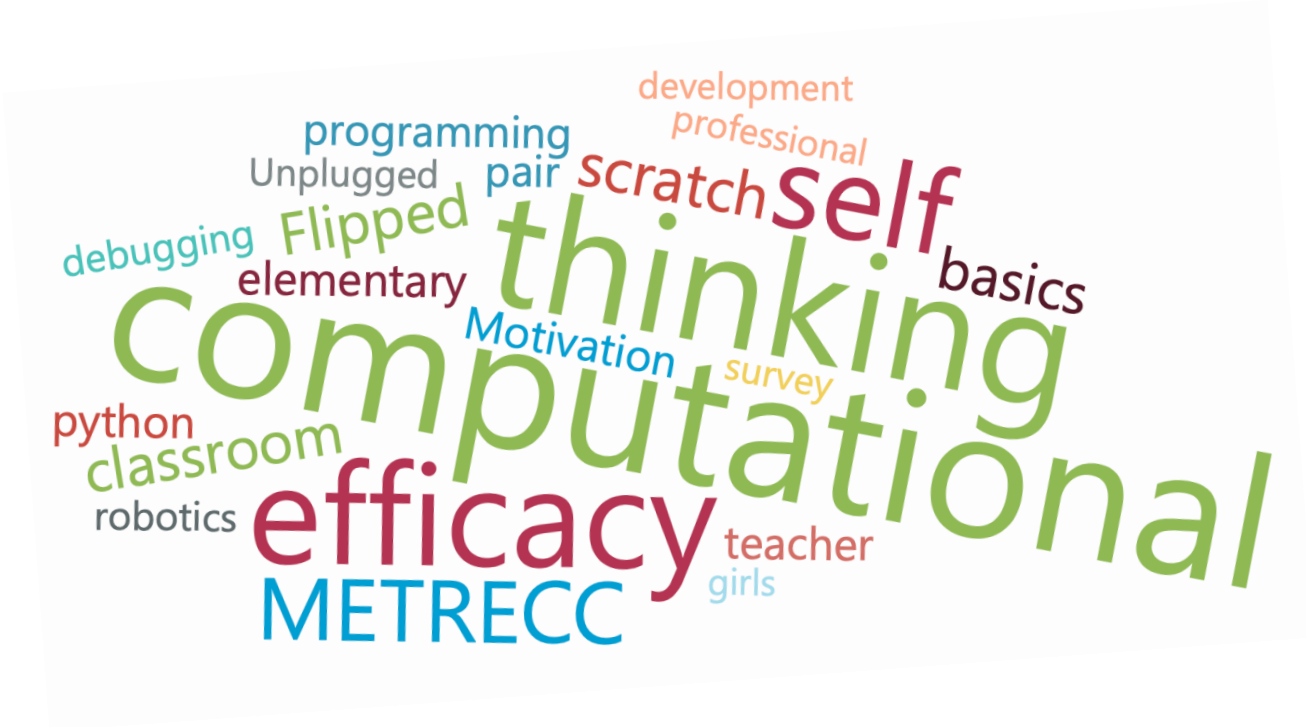
What are you searching for?

Visitors to our site include students, professors, teachers, researchers, corporate and individual donors, and more. The word diagram shows the top 20 most searched terms and we think it captures the essence of our user base quite well. The term computation thinking is the most searched term followed by self-efficacy.



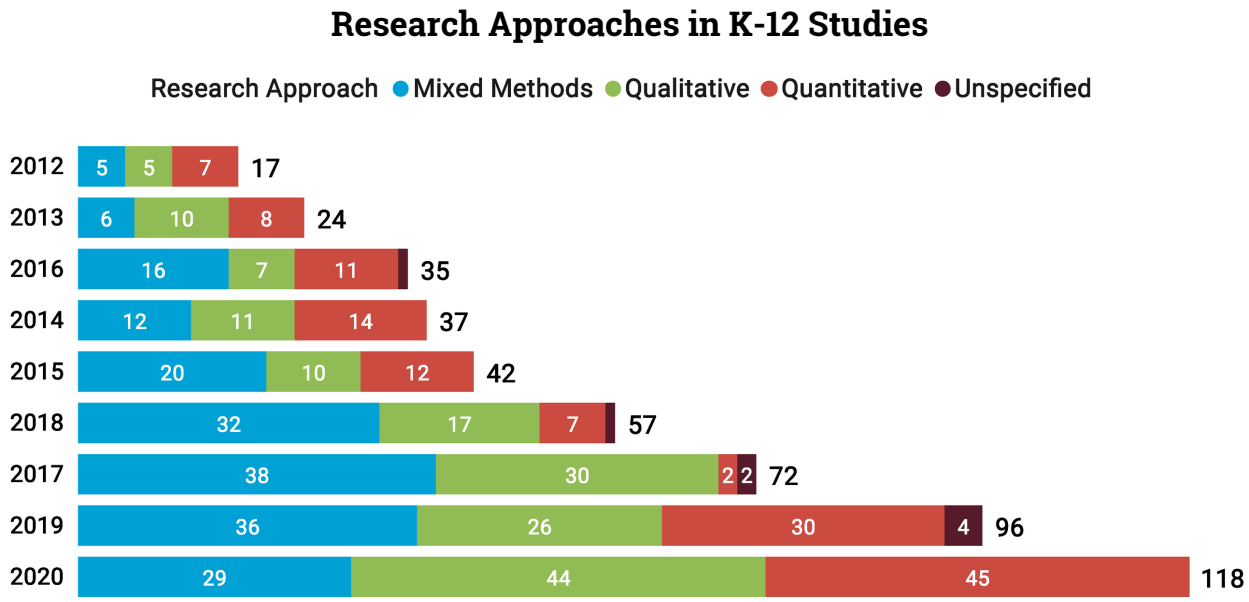
Research Articles

Compared to subjects like mathematics, reading, and writing that have been taught for decades or even centuries, conducting research in K-12 computer science education is a relatively new. We can look inward, as we do here, to see where gaps existing in research and reporting by considering how other more mature fields have used research to inform practice.

509 K-12 education research articles in our dataset were published between 2012 - 2020.

Our site includes research guides that serve as a reference and reminder for conducting and reporting on research studies for K-12 computing education. These have been created to mitigate some of the gaps in reporting data from studies to help ensure the data is complete and studies can be replicated by others.

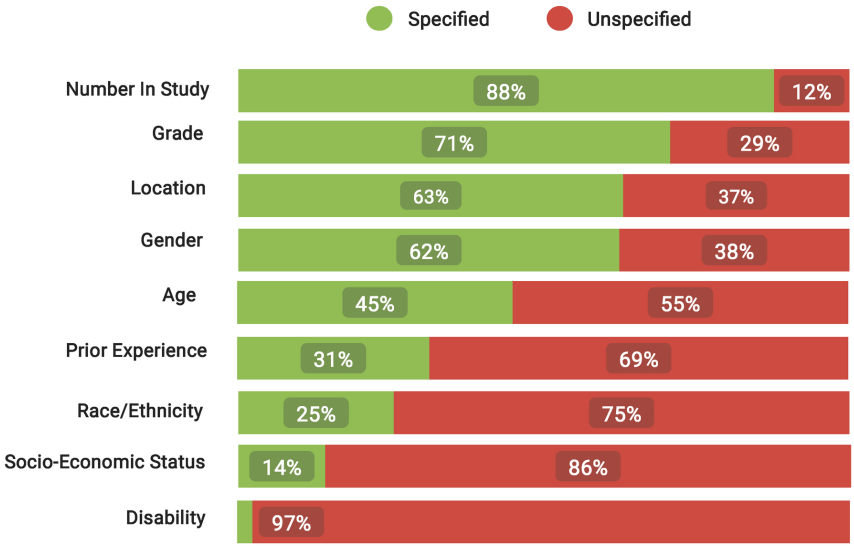
Research studies use a variety of methodological frameworks and approaches, which we can collect to compare across reports. The below bar chart presents the distribution of research approaches as well as the overall growth in the number of research papers in computer science education throughout the years 2012 and 2020. Very few studies did not specify the research approach taken and among those that did, we can see a consistent growth in qualitative research specifically.



"The emphasis on qualitative research supports previous research in the computing education community that found that qualitative methods are often overlooked, but they have the power to provide significant value, particularly in evaluating the ”why and how” behind the success or failure of various practices (McGill & Decker, 2018)".

Student Diversity in Studies

Reporting demographic and other relevant components about students participating in any study is important for ensuring their representation in the classroom and society. This type of data will help researchers improve the inclusiveness as well as the quality of their studies, set a standard of necessary data needed to replicate studies, and provide a basis for comparing activities and activity outcomes across multiple studies and experiences. Researchers can be at the forefront of the push for reducing bias as they collect and analyze data to recommend changes for transforming CS education.



Fewer than 40% of studies contained any information on student race or ethnicity, socio-economic status or prior experience in computing.

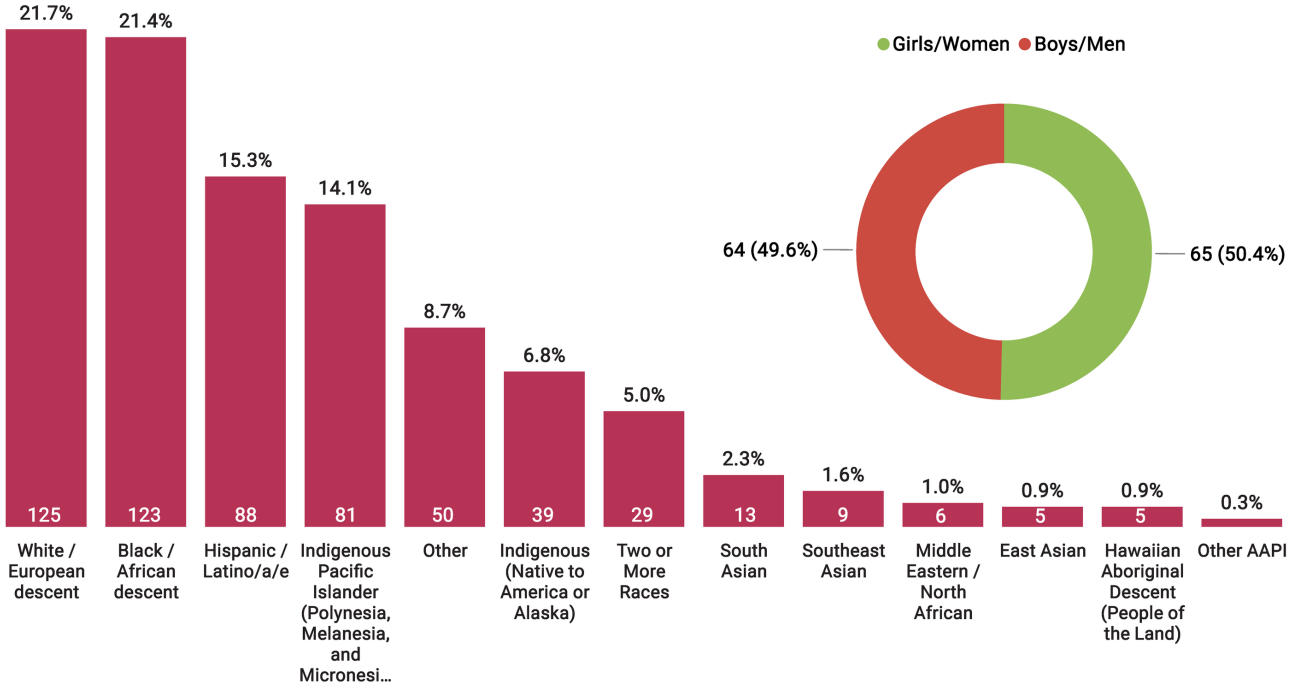
At merely 3%, disability is the least reported demographic characteristic among study participants, yet in the U.S. students with some form of disability make up 14% of the student population.

We highly encourage researchers to account for such data as it provides awareness of how disabilities may impact learning with an intervention being studied, ensures equity-focused research, and helps create more accessible learning environments.

Only 1 in 4 research articles reported student races/ethnicities. From these, 1 in 5 reported students as Black and 1 in 5 reported students as White.

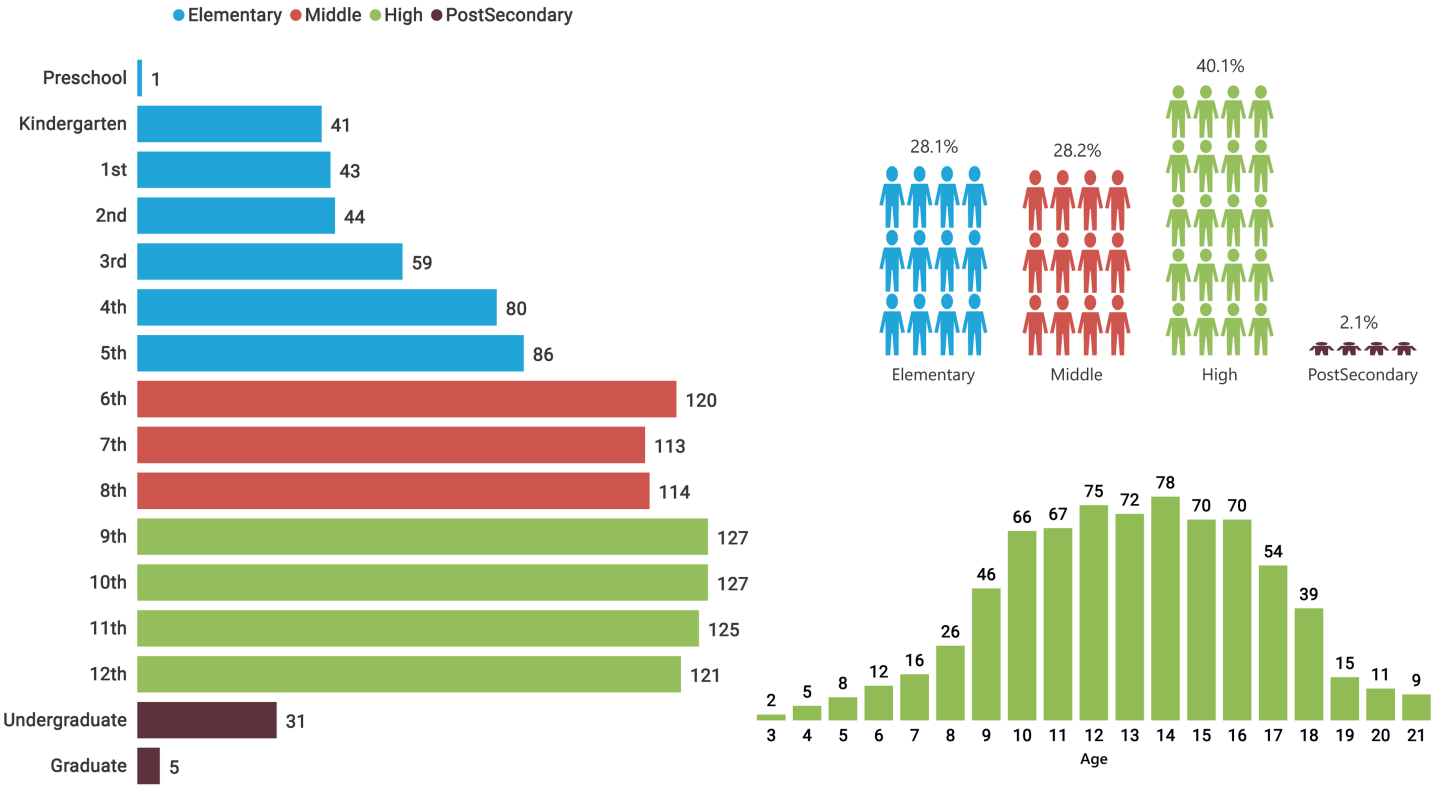
Research was more inclusive with respect to gender, with approximately half of the population being studied centered on girls. Transgender student participants were reported only in 2 articles in our dataset and no non-binary students were reported.

Reported Student Races/Ethnicities and Genders



Our data indicates that 2 out of 5 research articles focus on high school students. With the rapid growth of CS education in K-8, more research in earlier grades is needed to uncover promising practices for these learners.

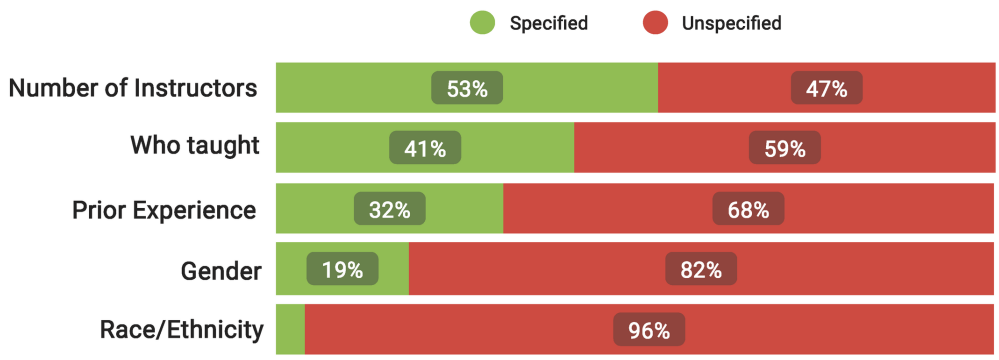
Student Grades, School Levels and Ages



From our data, we see that 7 of 10 articles reported grades, with the majority of research focused on high school students. As expected, there was a substantial drop in articles that included students in elementary schools, specifically lower elementary (PK-3).

The reported age reflects the reported grades and school levels. Although it may feel like reporting both pieces of information is redundant, we recommend researchers do so. Adding age helps in translating and comparing grade levels between US and non-US-centric systems of education and helps us understand how other countries approach teaching in those same grades.

Instructor Demographics



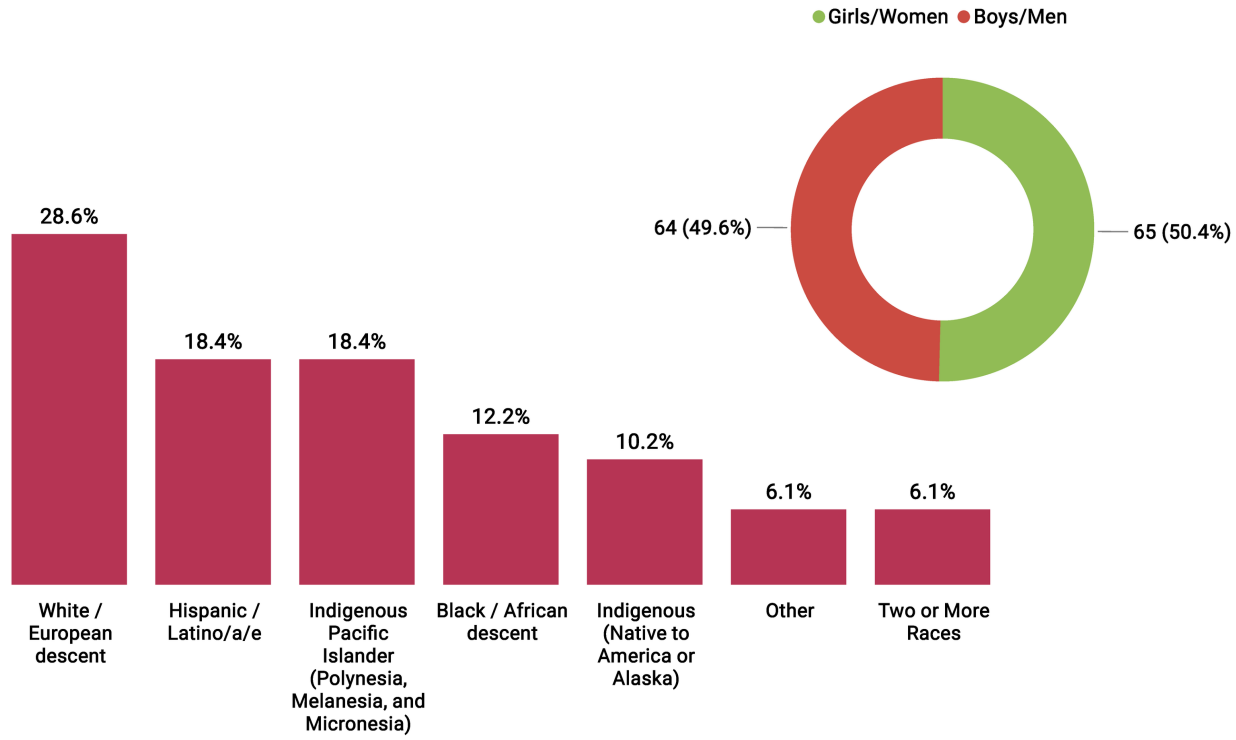
The number of instructors, a description of who taught the activity being studied and the instructor's prior experience were reported in less than half of the articles. Yet, it is well-researched that an instructor's prior experience can impact their students' academic achievement and growth.

While instructor gender was reported in 1 in 5 articles, only 1 in 25 articles reported instructor race/ethnicity.

According to U.S. data, the majority (79%) of K-12 teachers are white (NCES, 2019). Previous research indicates that there is a relationship between teacher identity, their ability to deliver culturally relevant pedagogy, and their ability to motivate and inspire students who look like them (cite).

As a variable that can influence a student's academic achievement and growth, reporting these measures can help us better understand the correlations between student and teacher identity.

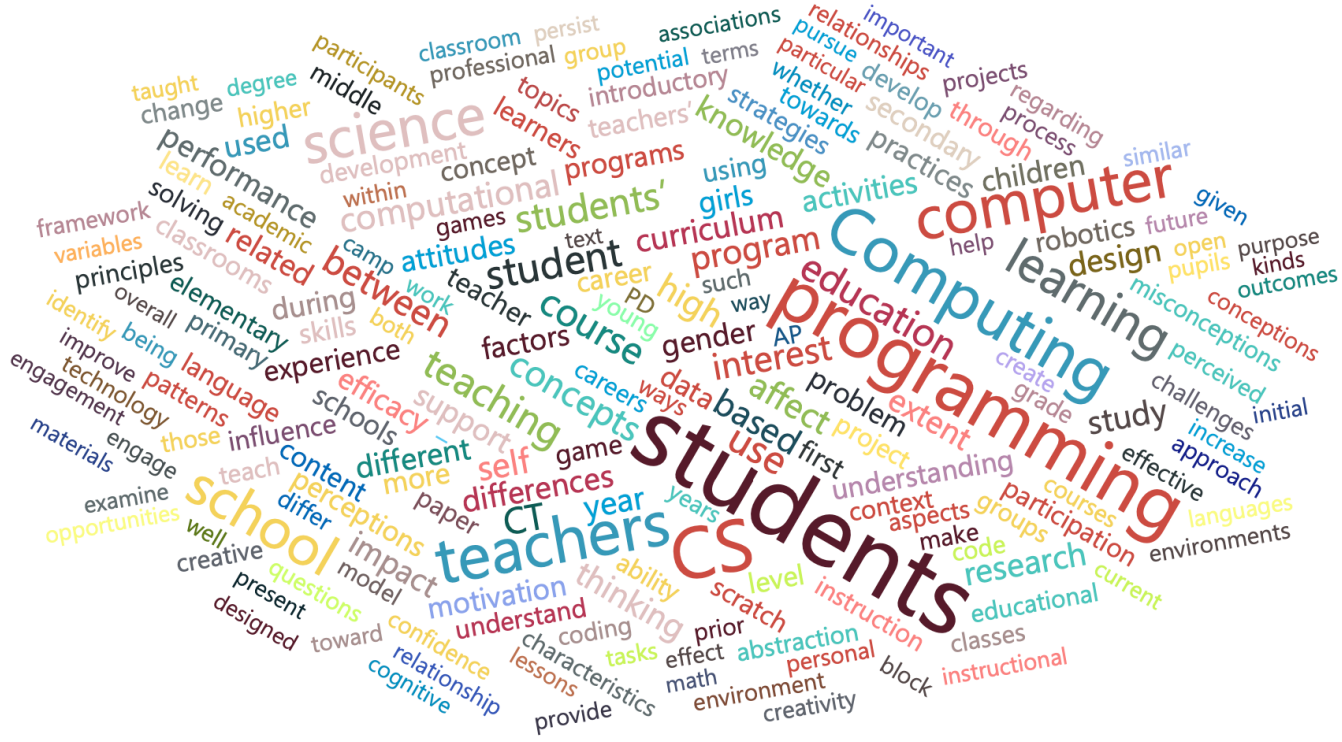
Instructor Race/Ethnicity and Gender



Though only 1 in 2 studies collected data on the instructor race and gender, roughly 1 in 3 of the instructors was White, 1 in 5 were Hispanic/Latino/a/e and 1 in 5 were Indigenous. Since only 4% of the articles specified the race of an instructor in general, this representation is gravely incomplete.

Similar to students, the distribution of instructor gender between Boys/Men and Girls/Women was quite even.

What types of research questions are being explored?



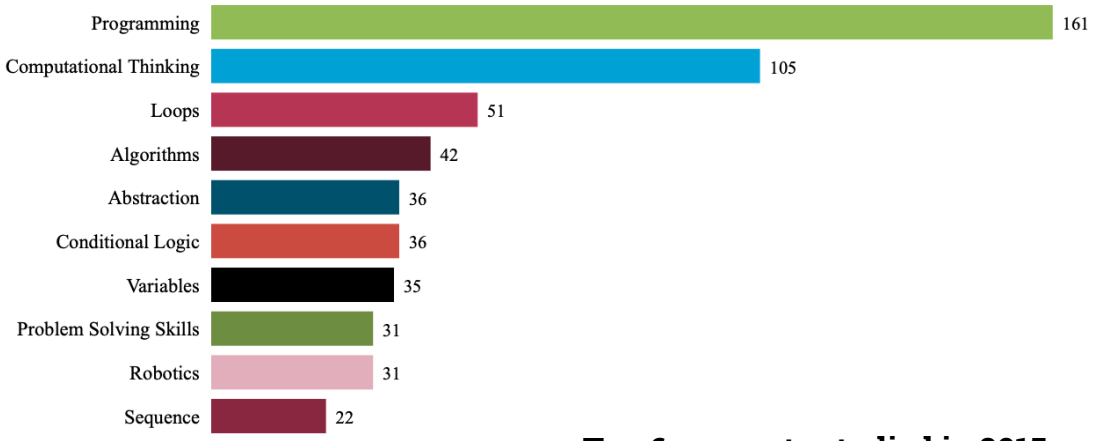
Top 200 words appearing in research questions

There are many research questions investigated within the studies. The top-200 words in the above cloud highlights common words across these research questions, indicating that the most used terms are associated with computer science education, students, and teachers.

One of CSEdResearch.org's goal is to drive K-12 CS education research forward by providing resources, training, and support to enable researchers to produce high-quality research that answers meaningful questions about K-12 CS education. By doing so, we can further the growth of research questions to cover a wide variety of topics among a diverse set of learners.

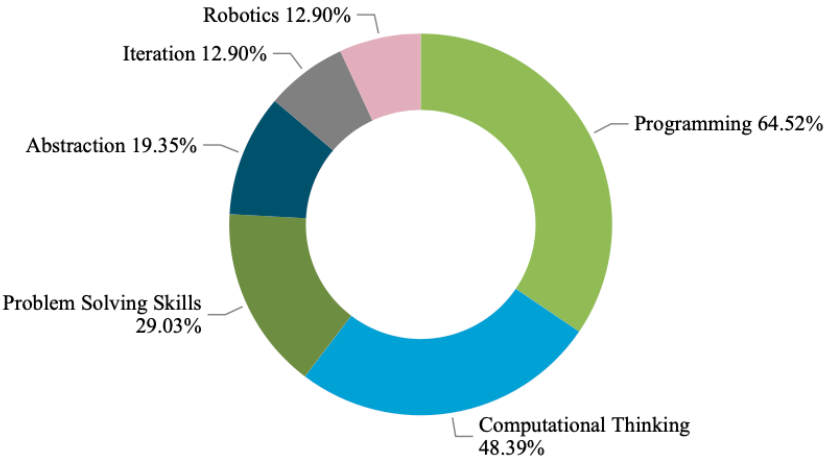
Concepts Taught

Top 10 concepts taught as noted in research articles (2012 to 2020)



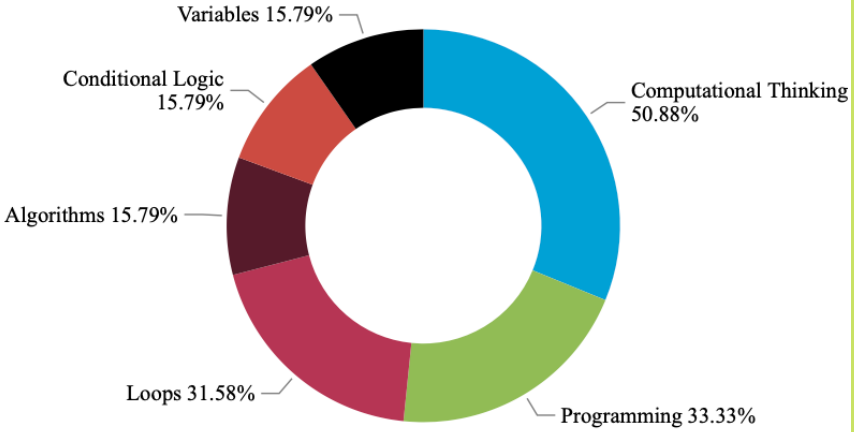
Researchers are collectively investigating teaching and learning around 120 concepts. Among these concepts, programming, computational thinking, and loops are investigated the most sought.

Top 6 concepts studied in 2015



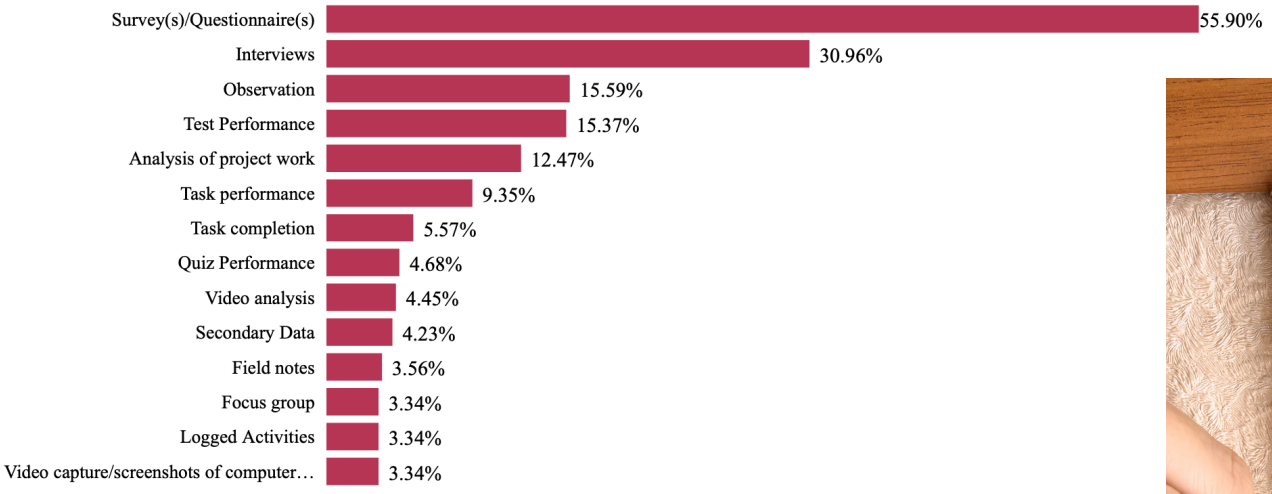
Of the top 6 concepts taught in 2015 and 2020, computational thinking and programming remain constant, though computational thinking has surpassed programming.

Top 6 concepts studied in 2020



Measurement Methods

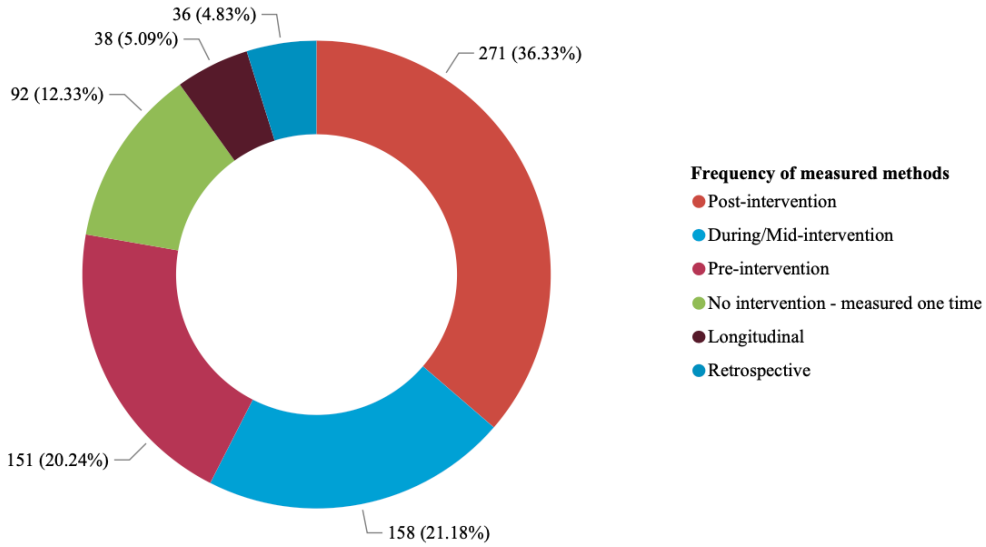
Top 15 methods researchers use to measure interventions



There are more than 50 methods researchers use to measure interventions. Over half of the studies use survey questionnaires, while approximately 3 in 10 use interviews. Researchers often use multiple forms of measurement to understand an intervention's impact.

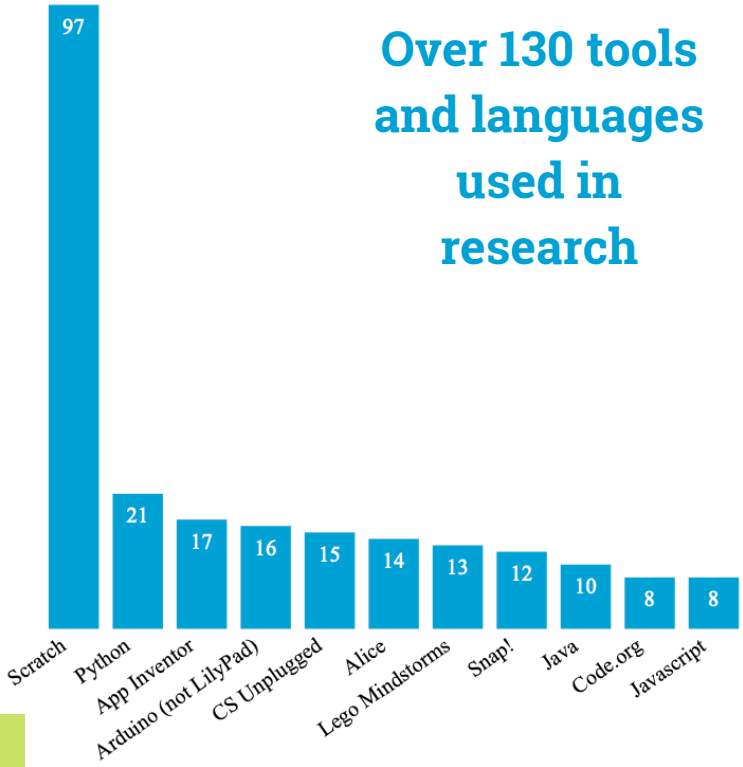
The frequency of these measurements varies depending on the type of study conducted. While 1 in 3 collect data after an intervention, 1 in 5 collect data mid-intervention and pre-intervention .

How frequently are interventions measured?



Tools, Languages, and Environments

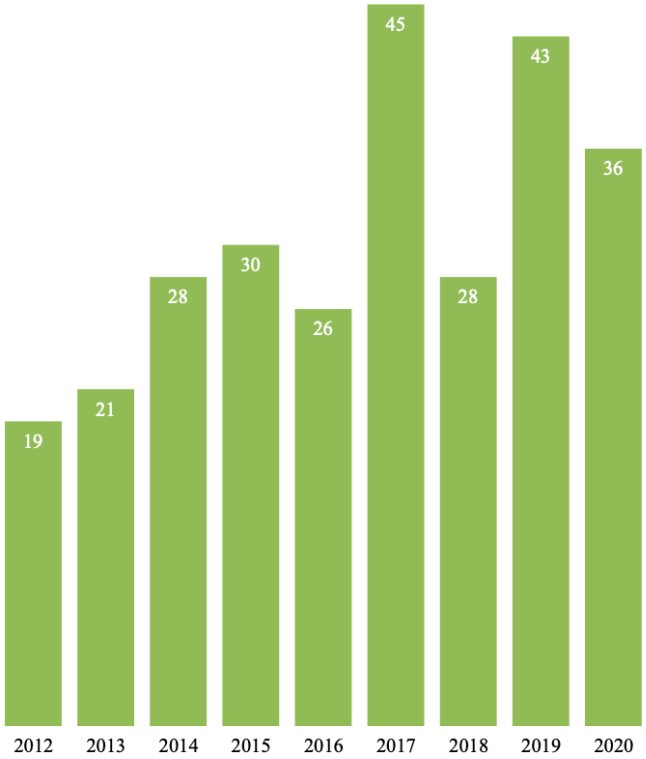
Top tools, languages, and environments used in studies



Over 130 tools and languages used in research

Tools and languages are an essential part of interventions, including the majority of studies investigating programming and computational thinking. Scratch, programming environment with an online community for children, remains the most investigated tool for learning computing. Children can use Scratch to program and share interactive media such as stories, games, and animation with people worldwide.

Number of tools, languages, and environments used in studies



The number of tools, languages and environments used throughout the years has steadily grown. The chart illustrates growth from 2012-2017 and then a decline, likely as some become more stable and dominant across the field.