THE COMPUTER SCIENCE TEACHER LANDSCAPE:

RESULTS OF A NATIONWIDE TEACHER SURVEY

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SUMMARY

Background

The technology sector remains one of the fastest growing industries across the nation and continues to rapidly permeate all facets of society. The next generation of the computing workforce must be equipped with the skills to examine how current systems exacerbate inequities and to develop new, more equitable innovations. To enable this shift, computer science (CS) instruction needs to develop not only students' computing identities and computational thinking, but also critical thinking and ethical reasoning. Teachers are key to this transformation, yet little is known about the landscape of PreK-12 CS teachers and how equipped they are to provide equitable CS instruction. In order to examine the backgrounds of CS teachers and the support and resources needed to implement culturally-relevant computing pedagogical practices, the Kapor Center and the Computer Science Teachers Association surveyed nearly 3,700 PreK-12 CS teachers across the nation in summer 2020.

Key Findings

DEMOGRAPHICS OF CS TEACHERS

Despite the growing racial and ethnic diversity of the U.S. PreK-12 student body, the majority of CS teachers were white (75%) and women (64%), situated predominantly in high income, urban, and less racially diverse schools.

CREDENTIALS AND EXPERIENCES OF CS TEACHERS

Data revealed that CS teachers have a wide variety of post-secondary degrees and credentials, and took multiple pathways to enter CS classrooms. The majority of teachers did not hold a degree or credential in the Computer and Technical Sciences. Despite this, participation rates in ongoing CS professional development remained low.

30%	46%	53%	61%
of teachers graduated with a Computer and Technical Sciences degree and 6% graduated with a minor in CS.	of teachers held credentials in Computer and Technical Sciences, 49% held credentials in another area, and 5% held no credentials.	had 11+ years of classroom experience, but considerably fewer teachers reported 11+ years of experience in CS classrooms (16%).	reported participating in a professional learning community, and 28% of teachers reported participating in ongoing coaching.

CHALLENGES TO EQUITABLE CS CLASSROOMS

In their efforts to design and facilitate equity-focused CS education to meet the needs of all students, teachers reported several challenges to implementation, including insufficient resources, limited budgets, a lack of computing content knowledge, and a lack of student engagement.

35% of teachers did not have the material, supplies, equipment, and space necessary to teach CS.

27% felt limited by their own subject matter expertise, specifically in elementary schools and lower-income schools, and expressed the need for low-cost CS professional development and collaboration opportunities.

24% reported that inequitable access to early computer science coupled with a lack of support often restricts and deters students historically excluded from pursuing the computing field.

39% of teachers did not see the importance of covering computing's role in perpetuating biases related to racism, sexism, and other inequities in the classroom.

CURRENT STATE OF CULTURALLY-RELEVANT PEDAGOGY IN CS CLASSROOMS AND CHALLENGES TO IMPLEMENTATION

Data revealed that not all classroom curricula are effectively engaging students in a culturally-relevant manner nor do CS teachers feel equipped to lead culturally-relevant pedagogical practices.

65% of teachers believed that existing CS curricular resources met the needs of a diverse student body.

55% of teachers found themselves having to revise existing curricula to make it more engaging and relevant to students.

53% of teachers felt existing curricula were culturally-relevant, and 57% felt equipped to utilize culturally-relevant pedagogical practices.

59% of white teachers (compared to 67% of Black, Indigenous, Latinx, and Pacific Islander teachers) were confident utilizing material highlighting race, ethnicity, and culture.

Recommendations for Policy and Practice

1.

Develop Incentive Structures to Recruit, Retain, and Diversify the Pool of CS Teachers

There is a dire shortage of CS teachers nationally, especially those who are Black, Indigenous, Latinx, and Pacific Islander. By developing new approaches to incentivize teachers to join and stay in the CS educator pipeline, schools will more likely be able to tackle the current challenge of filling and diversifying these roles.

2.

Build Comprehensive Teacher Training, Certification, and Endorsement Programs Aligned to an Equity-Focused Computing Education Framework

Data showed high degrees of variability among CS teachers with respect to their experience with computing, confidence in enacting culturally-relevant pedagogy, and ability to adapt material to meet their classroom needs. Greater alignment between teacher training, credentialing, and licensure programs, and an equity-focused computing education framework can mitigate these gaps in knowledge to ensure more equitable classroom practices.

3.

Expand Access to Ongoing Teacher Professional Development

The low rate of participation in ongoing professional development and coaching opportunities is a concern for teachers staying up-to-date on promising practices in CS education. Districts must commit to investing in quality ongoing teacher development, including coaching and learning communities, particularly for early-career teachers, elementary school teachers, and those teaching marginalized students groups.

4.

Prioritize CS as a Core Course Across the PreK-12 Pipeline

In order to develop students' computational thinking abilities for the needs of the workforce of the future, CS must be offered earlier in students' educational experience, across all school profiles, and must be adopted as a foundational discipline, similar to other core academic content areas.

5.

Build a District-Wide Coalition to Champion an Equitable CS Implementation Plan

Developing an effective strategic plan to implement equitable CS programming within schools is more likely to be successful when school districts--including leadership, teachers, parents, and students--show a collective commitment and shared buy-in to prioritizing CS education.

Conclusion

The nation must make long-term investments in the CS teacher workforce to ensure the equitable development of the next generation of computing professionals and informed citizens. Current teachers continue to report insufficient support and limited resources to carry out culturally-relevant CS practices. However, through strategic investments in teacher recruitment efforts, teacher preparation, and sufficient pedagogical resources, schools can effectively prepare students to become part of a more socially just workforce of the future.