



How to Teach Computer Science as both a Technical and Social Subject

Written by Amy J. Ko

* What is the Issue?

Many efforts to teach computer science (CS) focus purely on technical skills. While this can be consistent with the values of industry and students who aspire to join industry, a purely technical focus has consequences. First, students who do pursue industry will not understand how data and computing are impacting society in often negative ways, and will not be prepared to prevent such harm, often in negative ways. Second, students who may not be intrinsically interested in technical aspects of CS, but may be very interested in the connection between CS and current events, such as misinformation, disinformation, free speech, automation, surveillance, and more.

[Why it Matters to You

Teachers should aspire to broaden participation in CS by engaging questions of ethics, bias, justice, and harm in their classrooms.

District staff and **PD providers** should highlight the overlaps between CS and subject areas that already discuss ethics and justice, including social studies and humanities.

School leaders should understand that CS is not strictly a career and technical education subject, but one that spans all disciplines.

= Attending to Equity

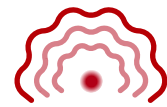
Teaching CS by examining society isn't about adding concepts to CS courses, but reframing what CS is. Algorithms aren't simply abstract procedures separate from the world, they are processes from the world, deployed into the world, that reshape how our world works in equitable or inequitable ways. Data isn't simply bits stored in a database, they are records of the past that we use to make predictions, decisions, and policies about people's lives in equitable or inequitable ways. Students, teachers, and school leaders alike must recognize that issues of diversity, equity, and inclusion are increasingly intertwined with the software in the world, and that school is one of the few places where youth can learn this.

Questions to Think About

- What opportunities do you see in your existing curriculum and lessons plans, either in CS classes or other subjects, to address CS and society?
- What partnerships between teachers in CS, social studies, and humanities might help students examine both the social and technical aspects of CS across the curriculum?

Things to Consider

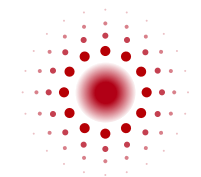
1 Students need to understand that CS **amplifies** the values and beliefs of social groups. For example, if people on Facebook are posting hate speech, misinformation, and harassment that is widely liked, Facebook's news feed algorithm will amplify that content, spreading it further. Teachers can develop lesson plans that engage students' preferred social media platforms, or even school information technology, investigating how they are amplifying positive and negative social patterns.



2 Students need to understand that CS **automates** human labor. For example, the world used to be full of music and book stores, owned by passionate fans who curated content and built community around shared interests. Companies like Amazon and Apple have replaced those stores and people with websites, and discarded the local communities in the process. Teachers can develop lesson plans that center students' own communities, what parts of their communities are at risk of automation, and how they might resist it.



3 Students need to understand that CS **centralizes** power. For example, what videos are recommended on TikTok is ultimately decided by the owners of the Chinese company ByteDance, not by a democratic process and not by its community of users. Teachers can develop lesson plans that examine how CS is used to accrue power, engaging students to debate how much power technology companies should have, and whether some of that power should be taken back by the public.



4 Students need to understand that CS **ignores** diversity, using abstraction to remove people and experiences at the margins for the benefit of the majority. For example, TSA security scanners, which use machine learning to identify "anomalies" underneath people's clothing, might make cisgender people feel safer, but such systems misclassify gender non-conforming and disabled people who do not have "normal" bodies, subjecting them to humiliating public searches. Teachers can develop lesson plans that examine the software in students' lives that does not account for their diversity.



Recommended Actions You Can Take

Read the forthcoming book from the University of Washington, Critical Computing Education: Methods for Secondary Education online for free at <http://criticalcsed.org>.