# CHAPTER 7:
# Education

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**ACCESS THE PUBLIC DATA**

**CHAPTER 7:**
Education

# Overview

AI has entered the public consciousness through generative AI's impact on work—enhancing efficiency and automating tasks—but it has also driven innovation in education and personalized learning. Still, while AI promises benefits, it also poses risks—from hallucinating false outputs to reinforcing biases and diminishing critical thinking. With the AI education market expected to grow substantially, ethical concerns about the technology's misuse—AI tools have already falsely accused marginalized students of cheating—are mounting, highlighting the need for responsible creation and deployment.

Addressing these challenges requires both technical literacy and critical engagement with AI's societal impact. Expanding AI expertise must begin in K–12 and higher education in order to ensure that students are prepared to be responsible users and developers. AI education cannot exist in isolation—it must align with broader computer science (CS) education efforts. This chapter examines the global state of AI and CS education, access disparities, and policies shaping AI's role in learning.

This chapter was a collaboration prepared by the Kapor Foundation, CSTA, PIT-UN and the AI Index. The Kapor Foundation works at the intersection of racial equity and technology to build equitable and inclusive computing education pathways, advance tech policies that mitigate harms and promote equitable opportunity, and deploy capital to support responsible, ethical, and equitable tech solutions. The CSTA is a global membership organization that unites, supports, and empowers educators to enhance the quality, accessibility, and inclusivity of computer science education. The Public Interest Technology University Network (PIT-UN) fosters collaboration between universities and colleges to build the PIT field and nurture a new generation of civic-minded technologists.

**CHAPTER 7:**
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# Chapter Highlights

**1. Access to and enrollment in high school CS courses in the U.S. has increased slightly from the previous school year, but gaps remain.** Student participation varies by state, race/ethnicity, school size, geography, income, gender, and disability.

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**2. CS teachers in the U.S. want to teach AI but do not feel equipped to do so.** Despite 81% of CS teachers agreeing that using AI and learning about AI should be included in a foundational CS learning experience, less than half of high school CS teachers felt equipped to teach AI.

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**3. Two-thirds of countries worldwide offer or plan to offer K–12 CS education.** This fraction has doubled since 2019, with African and Latin American countries progressing the most. However, students in African countries have the least access to CS education due to schools' lack of electricity.

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**4. Graduates who earned their master's degree in AI in the U.S. nearly doubled between 2022 and 2023.** While increased attention on AI will be slower to emerge in the number of bachelor's and PhD degrees, the surge in master's degrees could indicate a future trend for all degree levels.

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**5. The U.S. continues to be a global leader in producing information, technology, and communications (ICT) graduates at all levels.** Spain, Brazil, and the United Kingdom follow the U.S. as the top producers at various levels, while Turkey boasts the best gender parity.

# 7.1 Background

To expand our understanding of the current state of AI education, it is imperative to differentiate between AI in education, AI literacy, and AI education (see Figure 7.1.1). AI *in* education is the usage of AI tools in the teaching and learning process while AI literacy refers to the foundational understanding of AI—how it works, how to use it, and the risks of using it. AI education encompasses AI literacy plus students' proficiency in the technical skills required to build AI (data analyses undergirding AI technologies, identifying and mitigating data biases, etc.). For the purposes of this chapter, the data presented covers AI education.

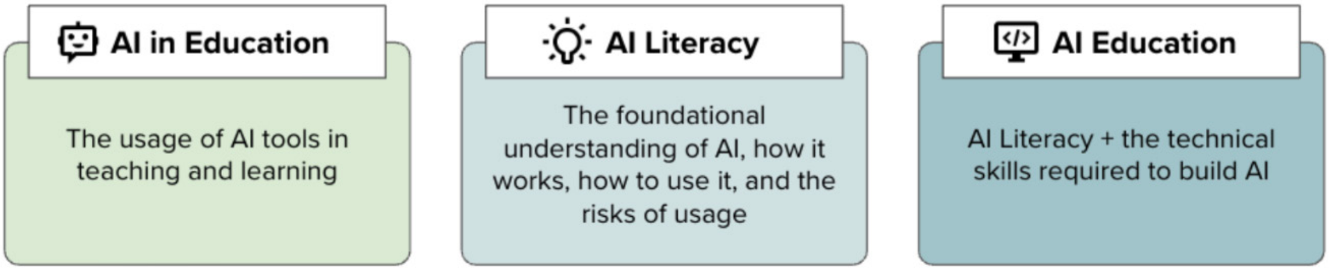


Figure 7.1.1

The world faces significant challenges in developing a robust and diverse workforce when disparities in infrastructure, access to resources and courses, and participation in high quality coursework continue to exacerbate vast inequities in K–12 students' ability to contribute to a technology-enabled future. While it is difficult to accurately estimate the extent of the problem due to the unstandardized nature of data collection and metrics development, this section focuses on the earliest stage in the computing pipeline by examining the current status of K–12 CS and AI education with existing global data.

# 7.2 K–12 CS and AI Education[1]

## United States

To begin exploring the prevalence and quality of AI education within the United States, it is important to start with the CS education landscape in its earliest stages almost a decade ago. With the launch of President Barack Obama's "Computer Science for All" initiative in 2016, billions in investments were provided to ensure that all K–12 students learn CS to become creators in the digital economy and responsible citizens of a technology-driven society. The federal funding was dedicated to enhancing professional learning efforts, improving instructional resources, and building effective regional partnerships toward expanding CS education access. The National Science Foundation also led the development and implementation of two new computing courses (Exploring Computer Science and AP Computer Science Principles) aimed at engaging a broader group of students in computing. At the same time, the technology industry and philanthropy invested millions in national efforts to introduce millions of students across the country to CS.

### Foundational Computer Science

In the past decade, educational advocates have implored policymakers to adopt legislation to improve access to CS education. These efforts have paid off. In the 2017–18 academic year, 35% of U.S. high schools offered CS, which increased to 60% of U.S. high schools in 2023–24. However, national trends can obscure the reality that prioritization of CS education varies by state. For example, 100% of high schools in Arkansas and Maryland offer CS, compared to only 31% in Montana (Figure 7.2.1).

**Public high schools teaching foundational CS (% of total in state), 2024**

Source: Code.org, CSTA, and ECEP Alliance, 2024 | Chart: 2025 AI Index report

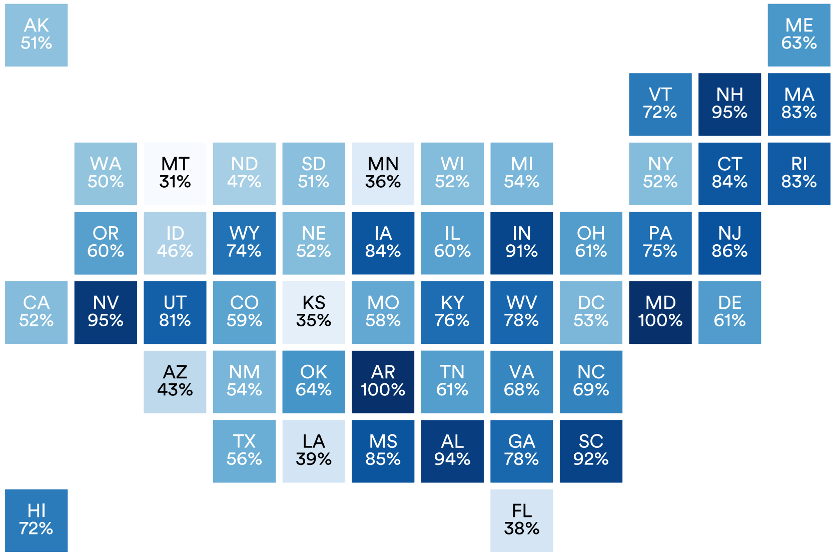


Figure 7.2.1

1 Since AI has historically been studied under CS, this chapter references CS education data when AI-specific data is unavailable.

Significant gaps remain in equitable access to CS education, with some student groups left behind. In the 2023–24 academic year, students eligible for free or reduced-price lunch (FRL); those in small schools; students living in urban and rural areas; and Native students were less likely to have access to CS education (Figures 7.2.2, 7.2.3, 7.2.4, and 7.2.5).

**Schools offering foundational CS courses by size, 2024**
Source: Code.org, CSTA, and ECEP Alliance, 2024 | Chart: 2025 AI Index report

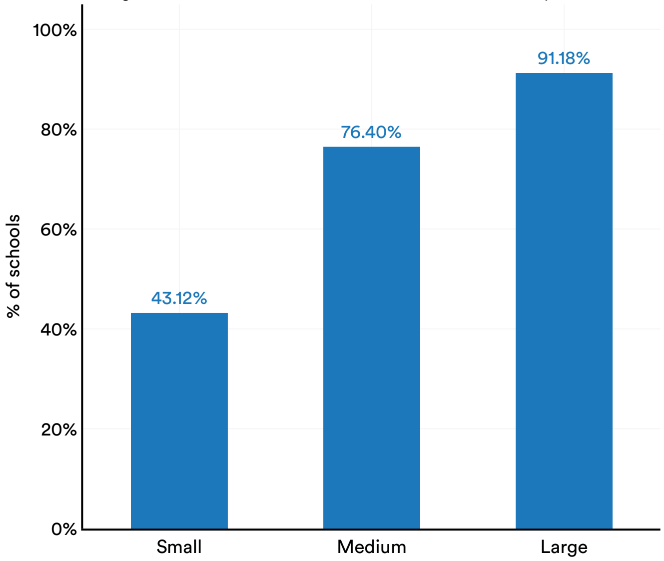


Figure 7.2.2

**Schools offering foundational CS courses by geographic area, 2024**
Source: Code.org, CSTA, and ECEP Alliance, 2024 | Chart: 2025 AI Index report

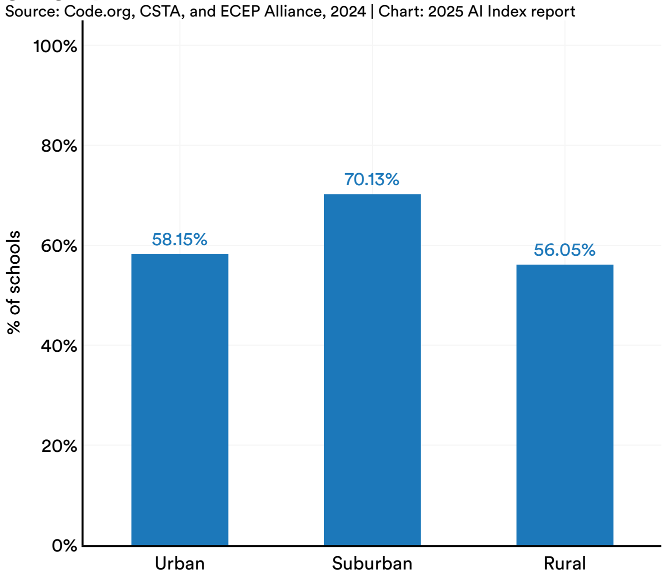


Figure 7.2.3

**Schools offering foundational CS courses by free and reduced lunch student population, 2024**
Source: Code.org, CSTA, and ECEP Alliance, 2024 | Chart: 2025 AI Index report

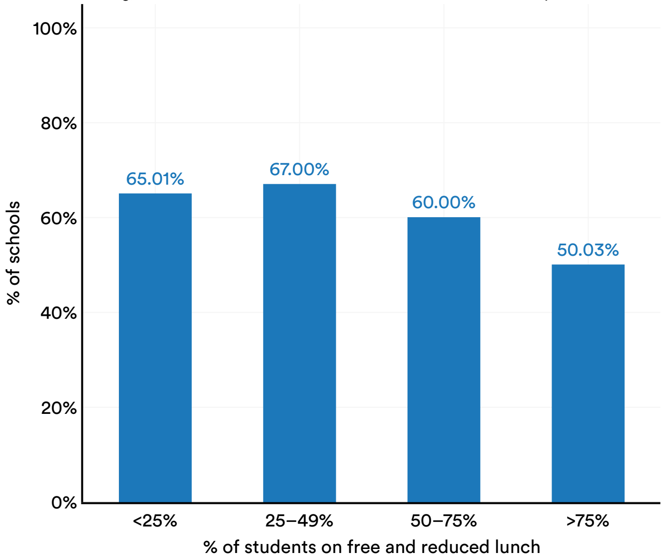


Figure 7.2.4

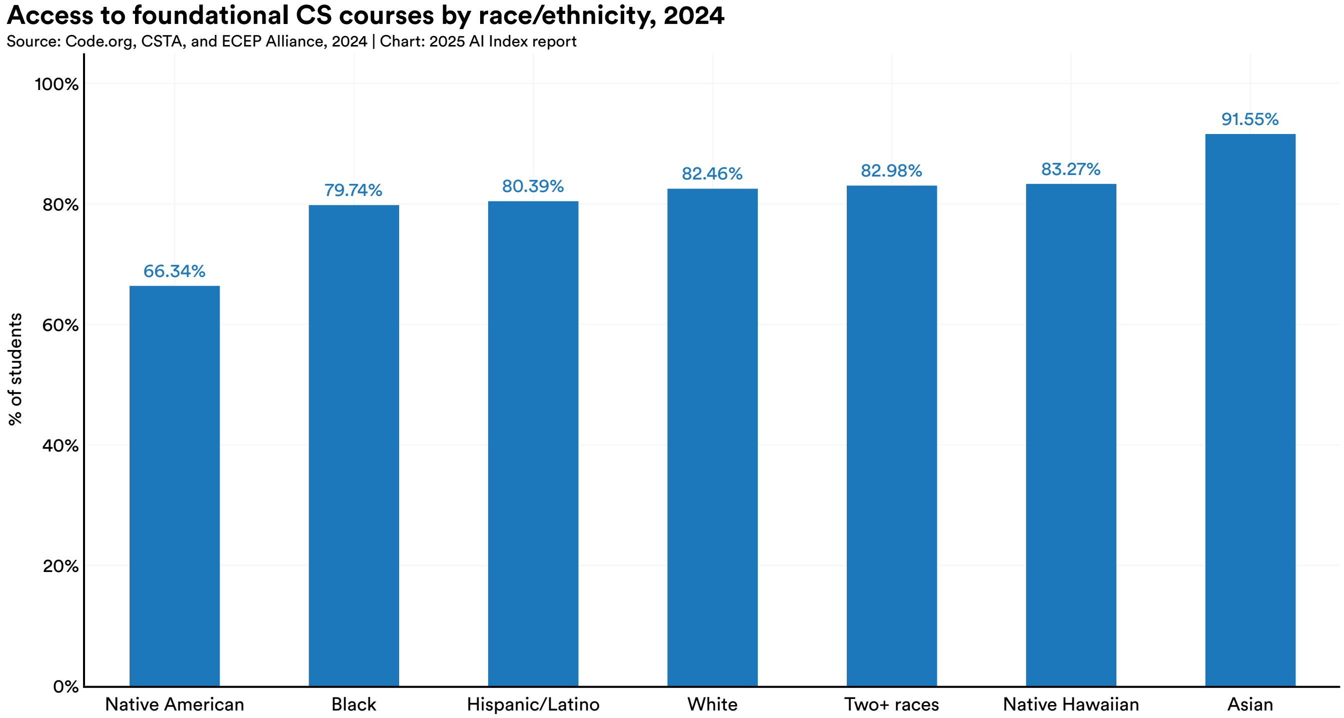


Figure 7.2.5

Data about participation in CS across 41 states indicates lags in student engagement with courses. In the 2020–21 academic year, only 5.1% of high school students participated in CS, with a marginal increase to 6.4% in 2023–24. Similar to CS access, CS participation varies highly between states—with 26% of high school students in South Carolina enrolled in CS but only 2% enrolled in Florida, Arizona, and Idaho (Figure 7.2.6).

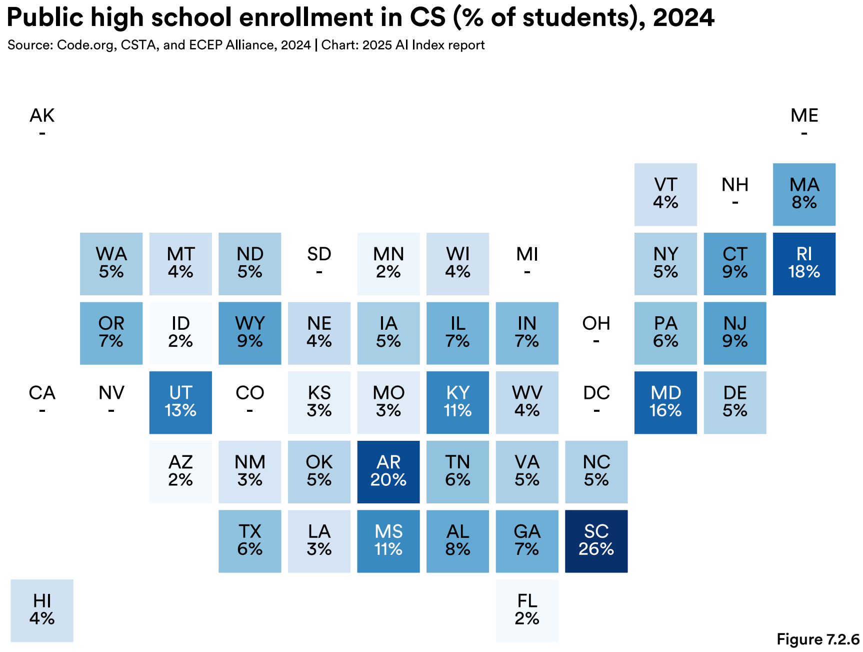


Figure 7.2.6

An analysis of CS enrollment by race and ethnicity shows that efforts to expand access have resulted in near or above proportional representation for Black, Native American/Alaskan, and white students at the national level (Figure 7.2.7). However, data gaps—particularly from nine states—warrant caution in viewing these trends as complete. Girls are underrepresented relative to their share of the K–12 population. Additionally, Hispanic and Native Hawaiian/Pacific Islander students, students with individualized education programs (IEPs), those eligible for free or reduced-price lunch, and English language learners remain underrepresented nationally (Figure 7.2.7 and Figure 7.2.8).

**Public high school enrollment in CS vs. national demographics by race/ethnicity, 2024**

Source: Code.org, CSTA, and ECEP Alliance, 2024 | Chart: 2025 AI Index report

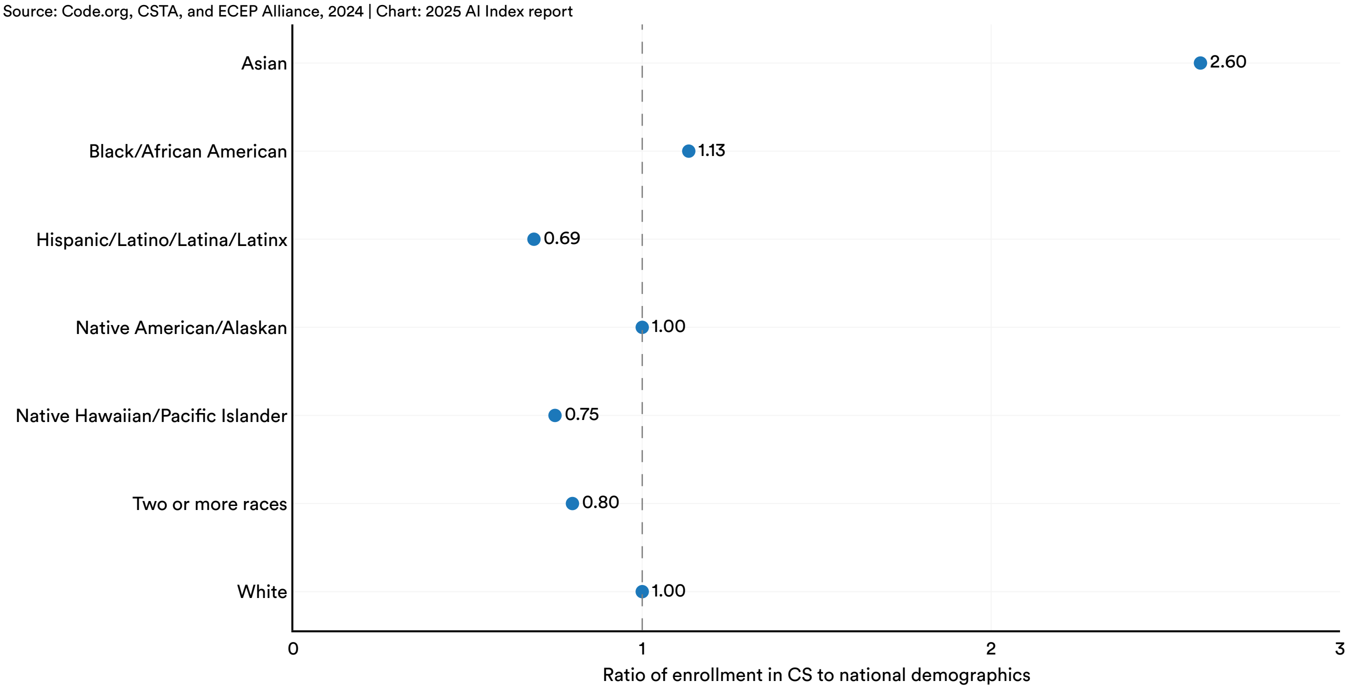


Figure 7.2.7

**Public high school enrollment in CS vs. national demographics by subgroup, 2024**
Source: Code.org, CSTA, and ECEP Alliance, 2024 | Chart: 2025 AI Index report

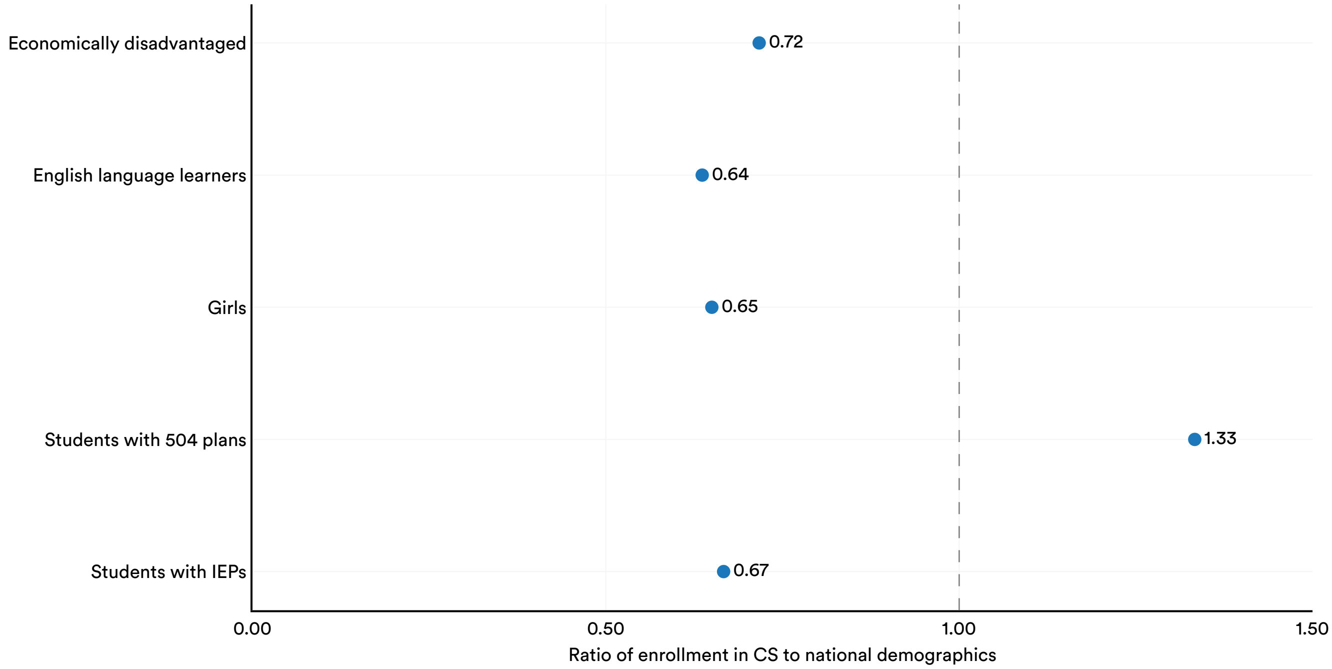


Figure 7.2.8[2]

## Advanced Computer Science

In order to build students' AI competencies, it is essential to offer access to advanced coursework in addition to foundational courses. While AI is not specifically covered in Advanced Placement (AP) CS A, AP CS Principles (AP CS P) does address some AI content areas. Because AP CS P was designed to attract a broader class of students, the potential exists to expose a diverse student population to AI topics. Yet, despite the growth in raw numbers of students participating in the AP CS exam (Figure 7.2.9), students do not participate in proportion to their racial and ethnic representation in the general student body (Figure 7.2.10 and Figure 7.2.11). Asian students, white boys, and multiracial students are overrepresented in the population of students who take AP CS exams, while all other student groups are underrepresented (Figure 7.2.12).

2 A student with a 504 plan receives accommodations under Section 504 of the Rehabilitation Act of 1973, a U.S. civil rights law that prohibits discrimination against individuals with disabilities. A student with an IEP (individualized education program) receives special education services under the Individuals with Disabilities Education Act. An IEP is a legally binding document that outlines a learning plan for a student with a disability designed to meet their unique needs and improve educational outcomes.

Number of AP computer science exams taken, 2007–23
Source: Code.org, CSTA, and ECEP Alliance, 2024 | Chart: 2025 AI Index report

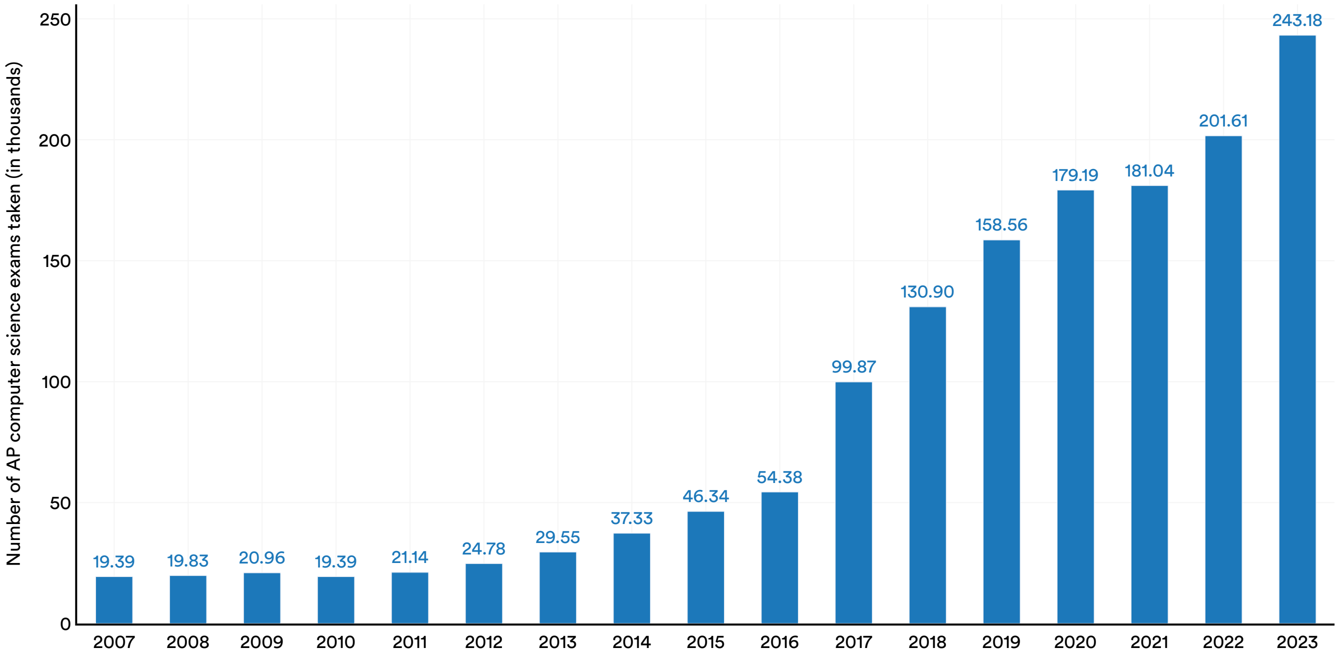


Figure 7.2.9

AP computer science exams taken by race/ethnicity, 2007–23
Source: Code.org, CSTA, and ECEP Alliance, 2024 | Chart: 2025 AI Index report

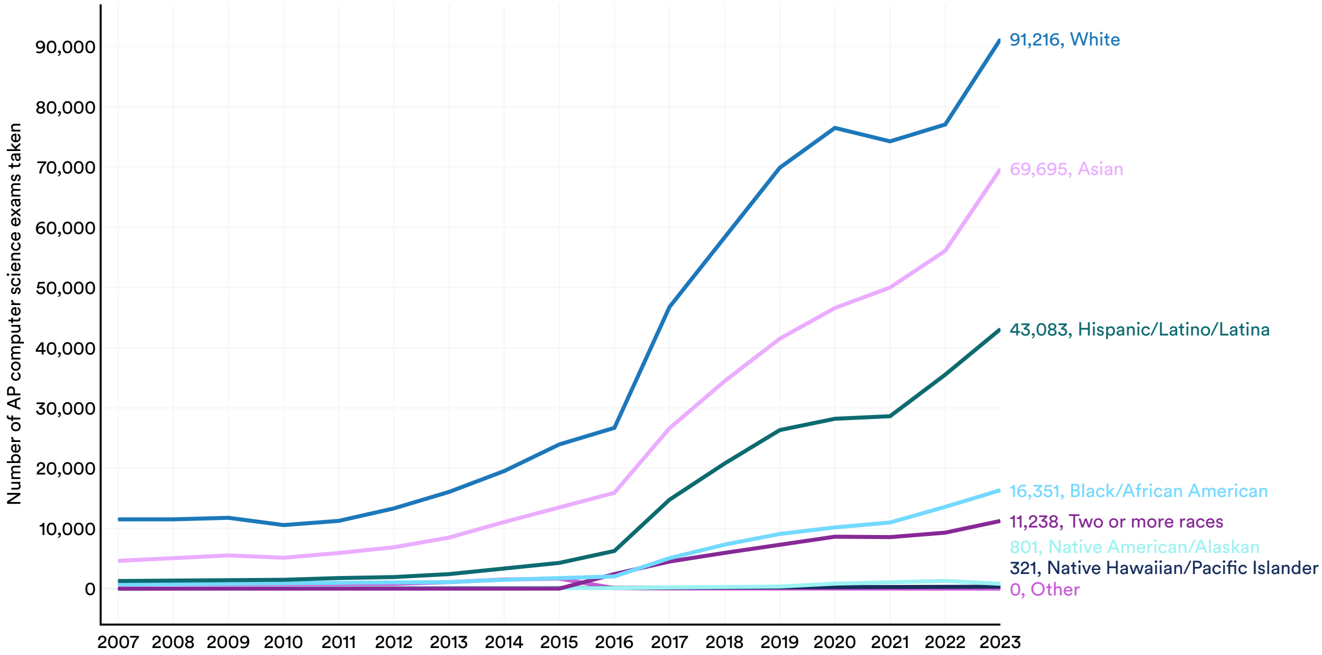


Figure 7.2.10

## AP computer science exams taken (% of total responding students) by race/ethnicity, 2007–23

Source: Code.org, CSTA, and ECEP Alliance, 2024 | Chart: 2025 AI Index report

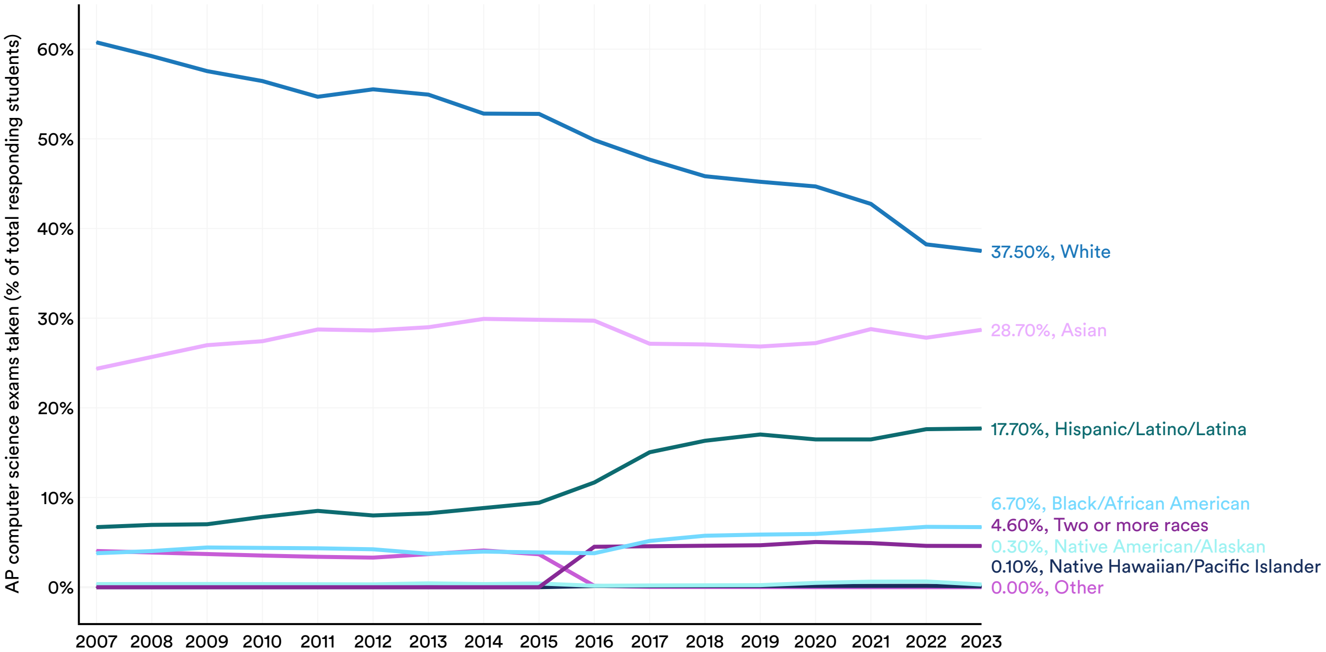


Figure 7.2.11

## AP computer science exam participation vs. national demographics by race/ethnicity, 2023

Source: Code.org, CSTA, and ECEP Alliance, 2024 | Chart: 2025 AI Index report

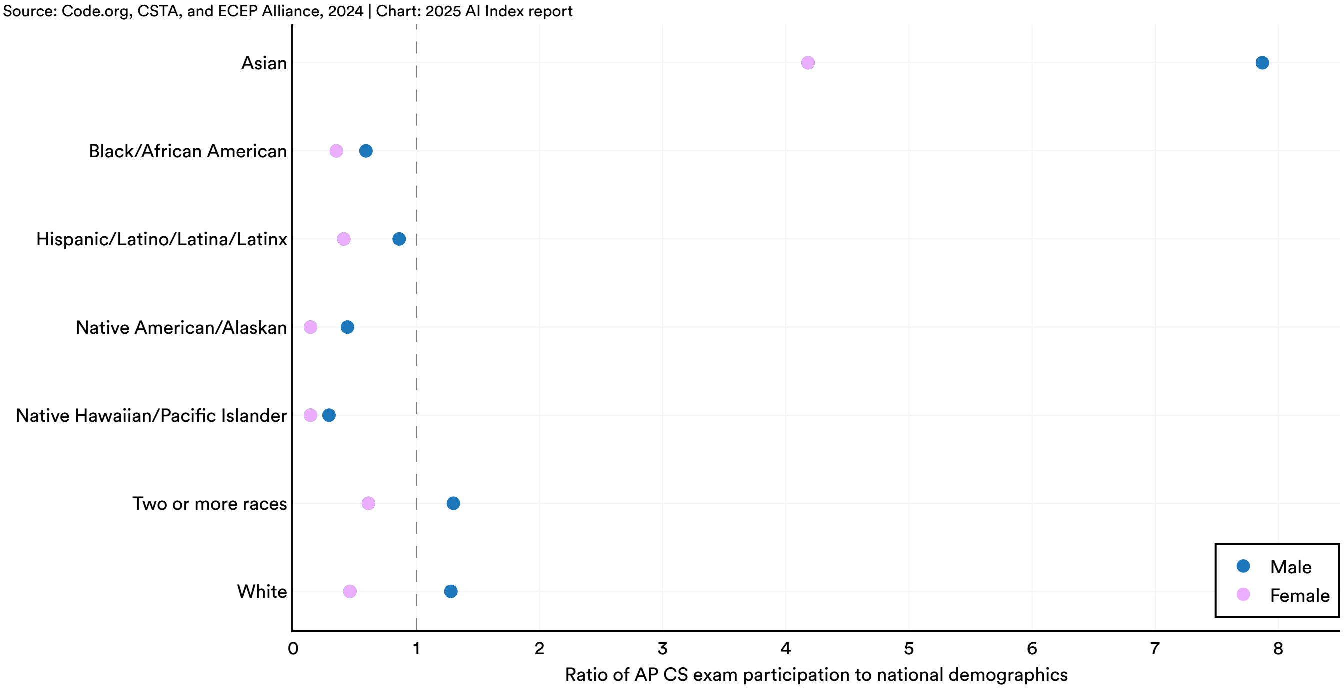


Figure 7.2.12

## Education Standards and Guidance

Federal guidance issued thus far has focused on AI *in* education rather than AI education. The U.S. Department of Education's Office of Educational Technology released a series of reports about AI in education in 2023 and 2024. One of the reports focuses on recommendations for educational technology developers, and two of them are intended for educators, educational leaders, and policymakers. The most recent report, from October 2024, offers guidance on the safe and effective implementation of AI in K–12 schools.

As of January 2025, 26 states have issued guidance on AI *in* education. And while there is considerable overlap between CS and AI education content and what teachers currently cover in the classroom, K–12 CS standards contain minimal AI content. The Computer Science Teachers Association (CSTA) K–12 standards, last published in 2017, contain only two standards at the advanced high school level that specifically require AI knowledge. However, existing CS standards support foundational AI knowledge and skills, covering topics such as perception, data structures, and algorithms. The U.S. state-adopted K–12 CS standards averaged 97% coverage of the same subconcepts as the CSTA standards, indicating strong national coherence in CS instruction. Among the 44 states that have adopted K–12 CS standards, 33 have AI-specific standards, which are generally minimal, aligned to the CSTA standards, and focused on high school grades (Figure 7.2.13).[3] Four of these states recently adopted more significant AI-specific standards that span grades K–12: Colorado (2024), Florida (2024), Ohio (2022), and Virginia (2024), while Arkansas has defined standards for a high school AI and machine learning course.

**Adoption of AI-specific K–12 computer science standards by US state**
Source: CSTA and IACE, 2024 | Chart: 2025 AI Index report

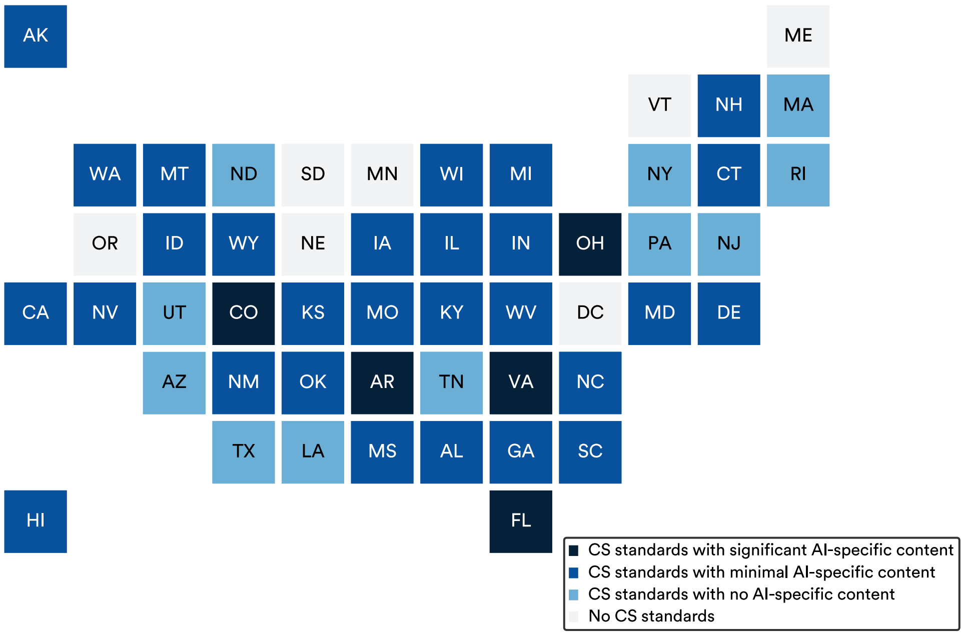


Figure 7.2.13

3 This project is supported by the National Science Foundation (NSF) under Grant No. 2311746. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the NSF.

## Teacher Perspectives

To examine the perspectives and practices of CS teachers as it relates to AI education, the Computer Science Teacher Landscape Survey collected data from 2,901 pre-K through 12 CS teachers nationally (33% of respondents were elementary school teachers, 36% taught middle school, and 51% taught high school).[4,5]

As AI education gains importance for future workforce readiness, it is important to understand the preparedness of the current educator workforce. While 81% of CS teachers believe AI should be included in foundational CS education, less than half feel equipped to teach it—46% in high school, 44% in middle school, and just 34% in elementary school (Figure 7.2.14).

**Percentage of teachers who feel equipped to teach AI by grade level**

Source: Computer Science Teacher Landscape Survey, 2024 | Chart: 2025 AI Index report

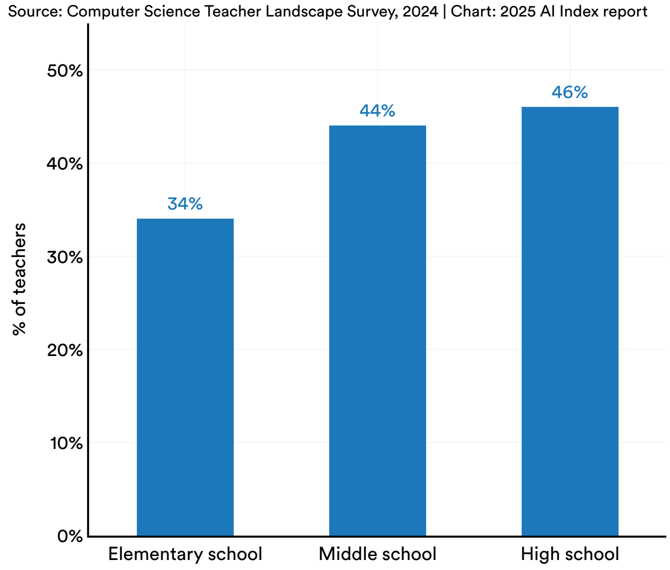


Figure 7.2.14

When asked to identify the CS-related topics they cover in class, over two-thirds of middle and high school CS teachers stated they cover AI specifically, despite the lack of explicit definition in CS standards; fewer elementary teachers (65%) reported covering AI (Figure 7.2.15). Greater proportions of CS teachers said they include *components* of AI, such as algorithms, computing systems, computational thinking, and programming.

**AI concepts taught in CS classrooms by grade level**

Source: Computer Science Teacher Landscape Survey, 2024 | Chart: 2025 AI Index report

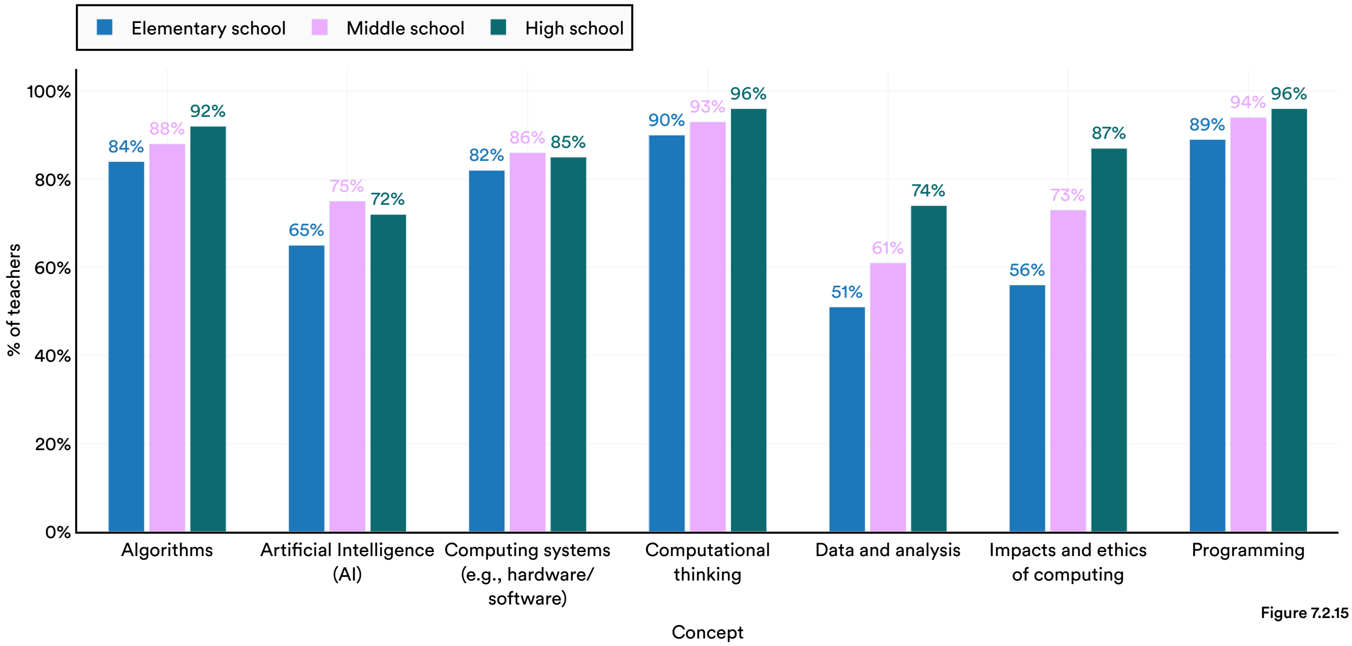


Figure 7.2.15

4 This project is supported by the National Science Foundation (NSF) under Grant No. 2118453. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the NSF. Survey responses may not total 100%, as some questions allowed respondents to select multiple options.

5 The percentages in the figure do not sum to 100% because respondents could select multiple options if they taught more than one grade level.

Of the 2,245 teachers who did spend class time on AI content, the majority spent fewer than five hours per course. Elementary school teachers spent the least amount of time, with 70% spending only one to two hours (Figure 7.2.16).

**Time spent learning AI in CS classrooms by grade level**
Source: Computer Science Teacher Landscape Survey, 2024 | Chart: 2025 AI Index report

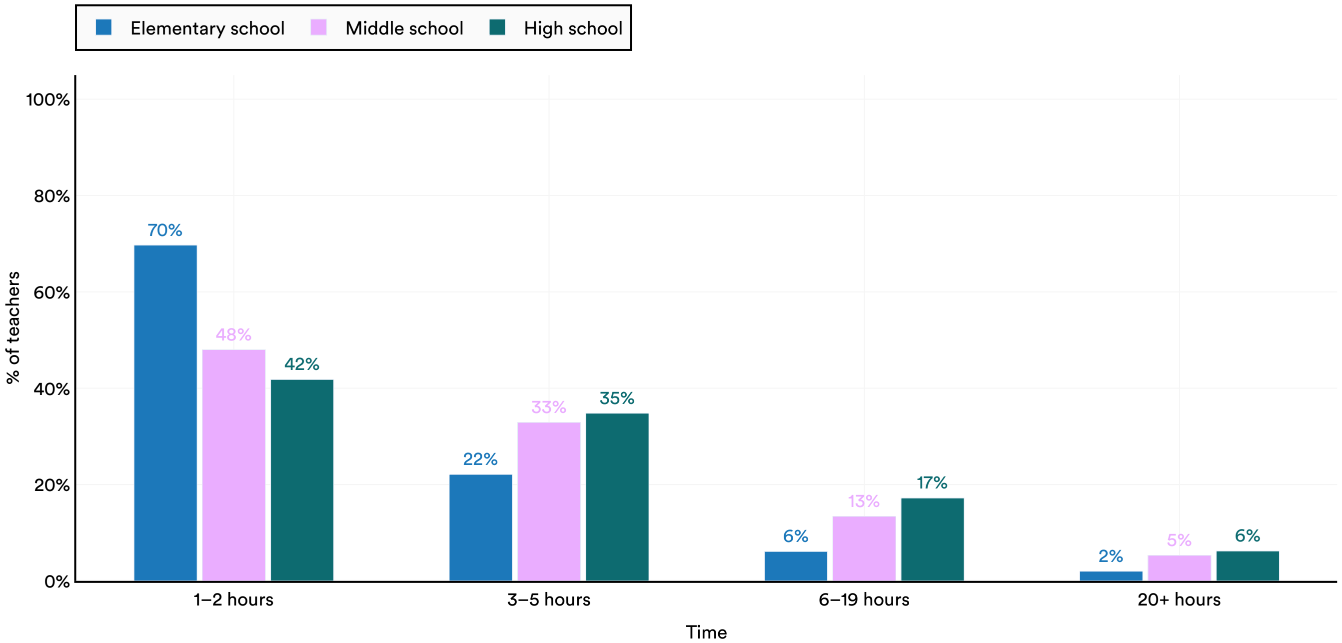


Figure 7.2.16

When asked to name the greatest benefits of using AI in the classroom, teachers most commonly said improving their productivity, differentiating student learning, providing improved academic support to students, and preparing students for the future. When asked about the greatest risks, teachers' greatest concerns were the misuse of AI (often related to academic integrity); that AI use could limit student learning or engagement; overreliance on the technology; that AI could generate misinformation and replicate biases; and other ethical concerns, including student privacy.

To equip students to use AI responsibly, the educator workforce must be upskilled. In a 2024 survey of 364 CS teachers, 88% identified the need for more resources for AI-related professional development. When asked to identify specific resources, CS teachers said they needed to gain more AI literacy (e.g., how AI works, how to use AI, and the ethical impacts of AI).

# Global

Thus far, very few countries (e.g., Ghana, South Korea, Netherlands) include AI education in their curricula explicitly; countries more often flag the importance of AI education in the national education strategy conversation without providing a detailed implementation plan. Because AI education has historically been subsumed under CS or information and communications technology (ICT) education, tracking CS and/or ICT education will serve as a proxy for tracking AI education in this analysis. Similar to the challenges inherent in tracking CS education in the United States, caution is called for when interpreting global metrics because CS and ICT education are sometimes conflated with digital or computer literacy.[6]

## Access

In 2024, approximately two-thirds of the world's countries offered or planned to offer CS education (Figure 7.2.17). CS education is mandatory in primary and/or secondary schools in 30% of countries, with Europe home to the highest concentration of these countries. In the past five years, all geographic regions have made progress in offering CS education, with Africa and Latin America registering the largest increases (Figure 7.2.18). Still, students in African countries are the least likely to have access to CS education. This is likely due to infrastructure challenges; in 2023, only 34% of primary schools in sub-Saharan Africa had access to electricity, hindering schools' ability to teach students computer literacy skills, let alone providing them with CS and AI education.

**Availability of CS education by country, 2024**
Source: Raspberry Pi Computing Education Research Centre, 2024 | Chart: 2025 AI Index report

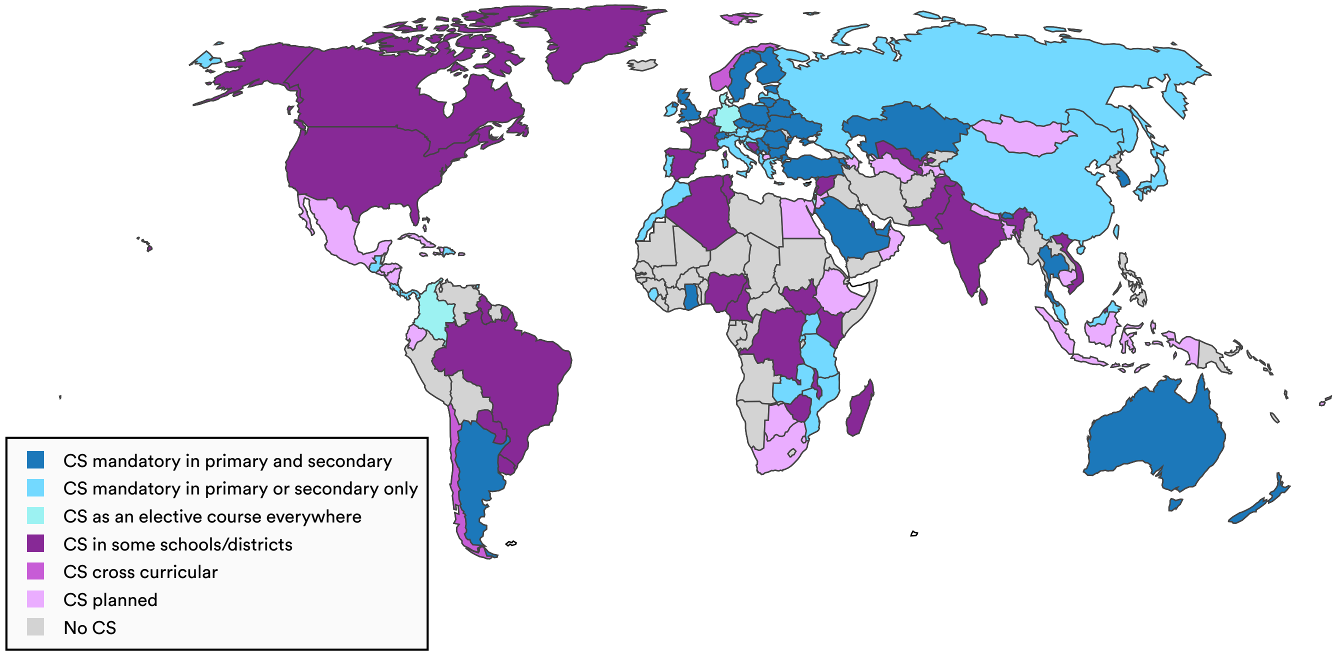


Figure 7.2.17

6 Digital literacy is the "ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills," whereas computer literacy is the "general use of computers and programs, such as productivity software."

Globally, the lack of standardized data collection makes it challenging to track progress in AI education. Language barriers and infrequent updates on implementation further complicate accurate monitoring across countries.

**Change in access to CS education by continent, 2019 vs. 2024**
Source: Raspberry Pi Computing Education Research Centre, 2024 | Chart: 2025 AI Index report

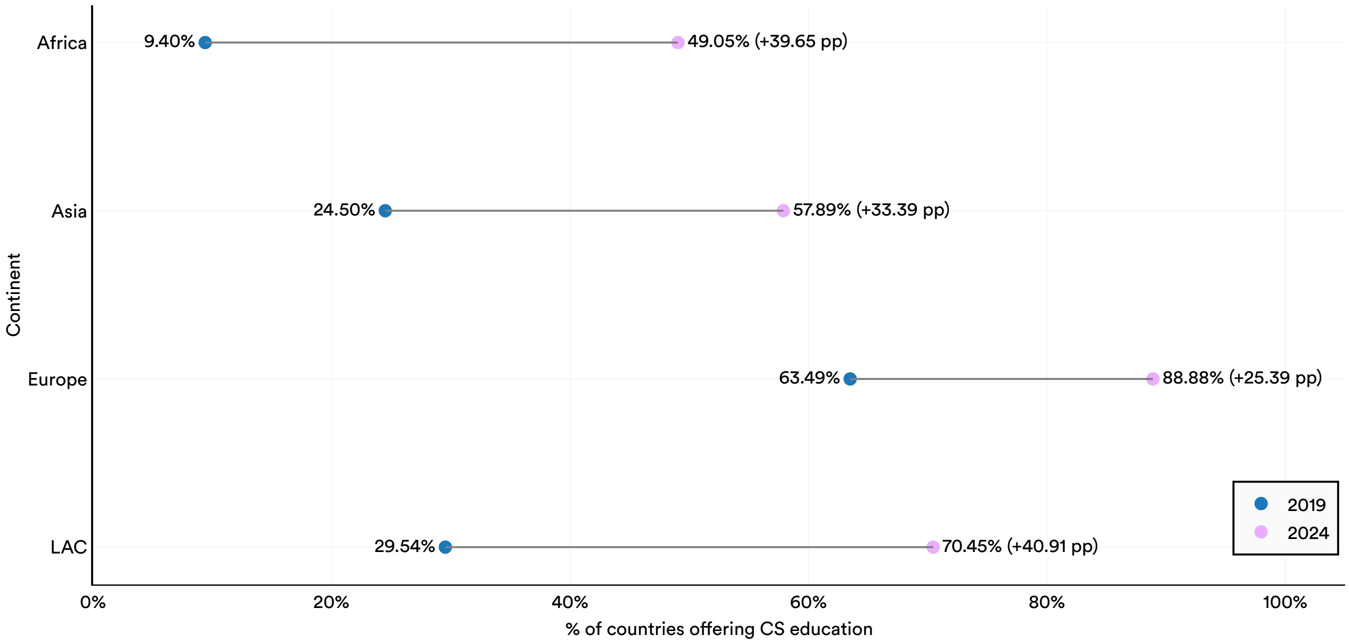


Figure 7.2.18

## Guidance

Countries on a global scale have been quicker to develop guidance and policies for the use of AI *in* education as opposed to developing national standards for teaching AI. As of November 2024, 10 countries have issued guidance on AI in education: Australia, Belgium, Canada, Japan, New Zealand, South Korea, Ukraine, the United Kingdom, the U.S., and Uruguay. This is not surprising given the decade-long conversation across countries about developing guidelines and policy recommendations for AI in education. As early as 2015, United Nations Educational, Scientific, and Cultural Organization (UNESCO) member states committed to harnessing technologies toward ensuring "inclusive and equitable quality education and promoting lifelong learning opportunities for all" (See Sustainable Development Goal 4). Since then, UNESCO published the Beijing Consensus on Artificial Intelligence and Education (in 2019) to offer specific guidance on how to integrate AI technologies to ensure all people have access to quality education by 2030 (See Education 2030 Agenda). Within this set of recommendations, there were four implementation and policy adoption guidelines that touch upon AI concepts in K–12 education.

Similar to the AI4K12 initiative, which released a set of K–12 AI education standards organized around "Five Big Ideas in AI" (Figure 7.2.19), international organizations are also developing AI curricular frameworks for countries to use. Last year, UNESCO published AI competency frameworks for students and teachers. The student framework includes four core competencies: a human-centered mindset, ethics of AI, AI techniques and applications, and AI system design. In each competency, students progress from understanding to applying to creating. In the European Union, many countries rely on DigComp 2.2, a framework for developing citizens' digital competence, along with CS learning objectives for students. The most recent version has guidance on recommended knowledge, skills, and attitudes for interacting with AI, though it does not explicitly include guidance on teaching citizens to build AI systems.

**AI4K12 guidelines organized around 5 Big Ideas in AI**

Source: AI4K12, 2024

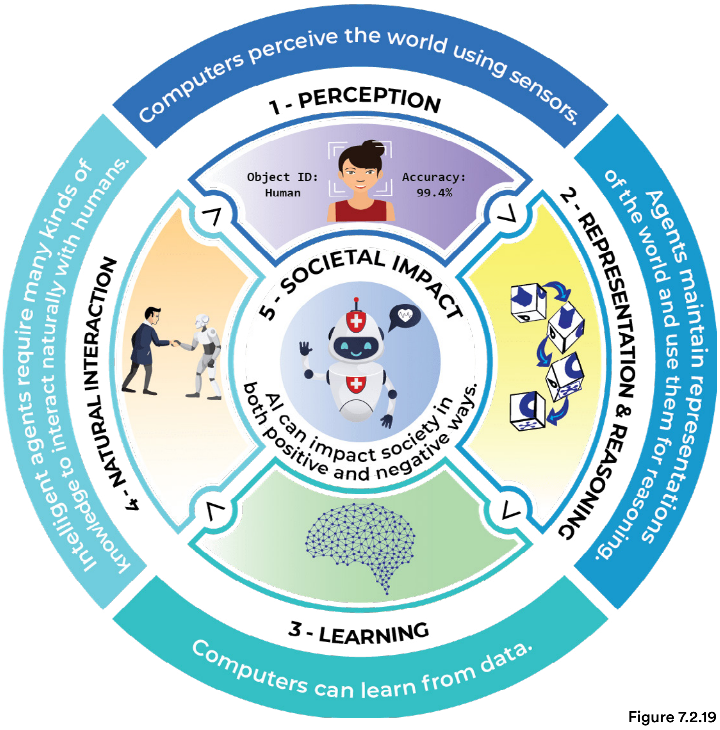


Figure 7.2.19

The role AI will play in the U.S. labor force and the economic future is yet to be fully understood, but its impact is expected to be substantial. The technology workforce already contributes significantly to the U.S. economy, with 9.6 million working as tech employees across industries. While there are strong concerns about displaced employment as a result of automation, projected demands for AI-related roles, such as database management and data infrastructure solutions, are likely to increase. Therefore, a global commitment to ensure postsecondary institutions are equipped to train the future workforce and expand the computing pipeline is essential.

# 7.3 Postsecondary CS and AI Education

## Degree Graduates

### United States

Data on U.S. postsecondary CS and AI education trends in this section comes from the National Center for Education Statistics (NCES). Notably, the Classification of Instructional Programs (CIP), a national standard for classifying academic programs, was developed by NCES under the U.S. Department of Education. In 2016, AI-specific curricula were designated under CIP code 11.0102, which covers programs focused on "symbolic inference, representation, and simulation by computers and software of human learning and reasoning processes and capabilities, and the computer modeling of human motor control and motion. Includes instruction in computing theory, cybernetics, human factors, natural language processing, and applicable aspects of engineering, technology, and specific end-use applications."

While the number of students earning associate degrees in CS has largely remained stable over the past decade, several community colleges are also pioneering AI education, offering certificate and both associate and bachelor's degree programs in AI and related fields (Figure 7.3.2). Notable examples include Maricopa Community Colleges, Houston Community College, Miami Dade College, and several schools in the Bay Area Community College Consortium.

The number of graduates with bachelor's degrees in computing has increased 22% over the last 10 years (Figure 7.3.1). In 2023, the top five producers of CS bachelor's graduates were Western Governors University, University of California–Berkeley, Southern New Hampshire University, University of Texas at Dallas, and University of Michigan.[7] While the increased attention on AI will be slower to show at the bachelor's degree level, given its four-year cycle, AI's explosive growth has already become visible in master's degrees, with a 26% increase in CS graduates between 2022 and 2023, and an overall increase of 83% in the last decade.

7 Western Governors University and Southern New Hampshire University are primarily online institutions.

**New CS postsecondary graduates in the United States, 2013–23**
Source: National Center for Education Statistics' Integrated Postsecondary Education Data System, 2013–23 | Chart: 2025 AI Index report

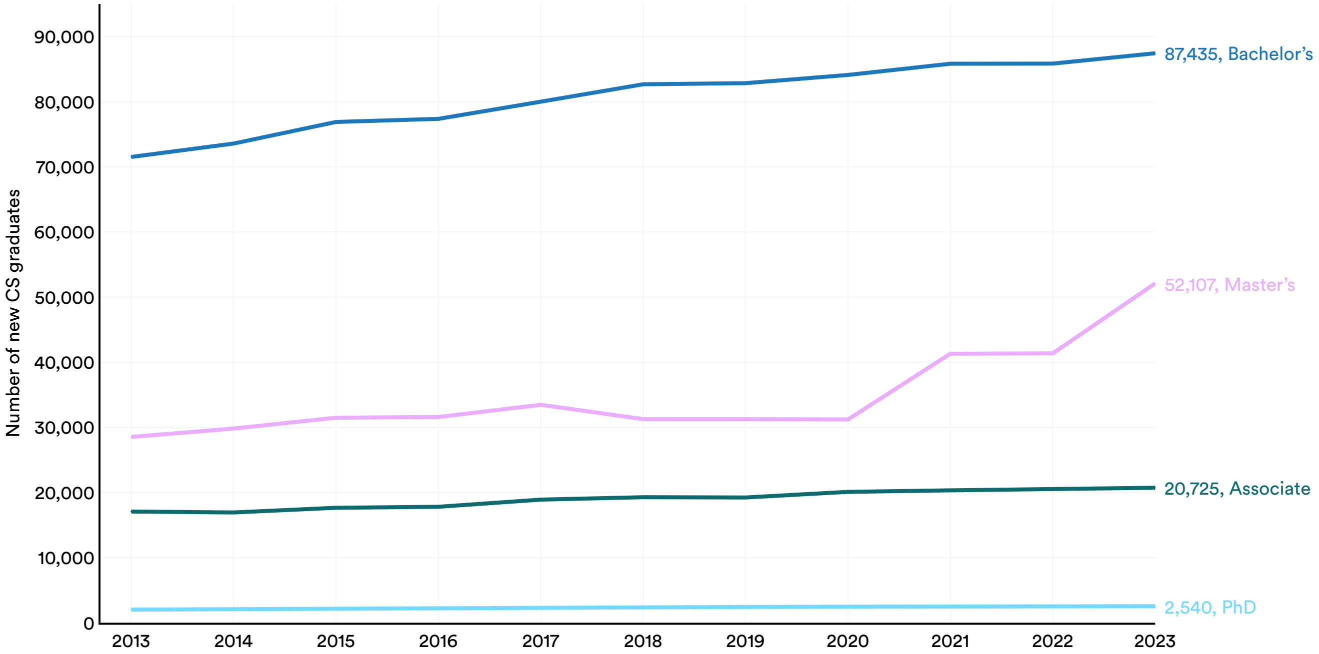


Figure 7.3.1

Despite the fact that women graduate from college at higher rates than men, degree completion data shows an underrepresentation of women in CS (Figure 7.3.2).

**CS postsecondary graduates in the United States by gender, 2023**
Source: National Center for Education Statistics' Integrated Postsecondary Education Data System, 2013–23 | Chart: 2025 AI Index report

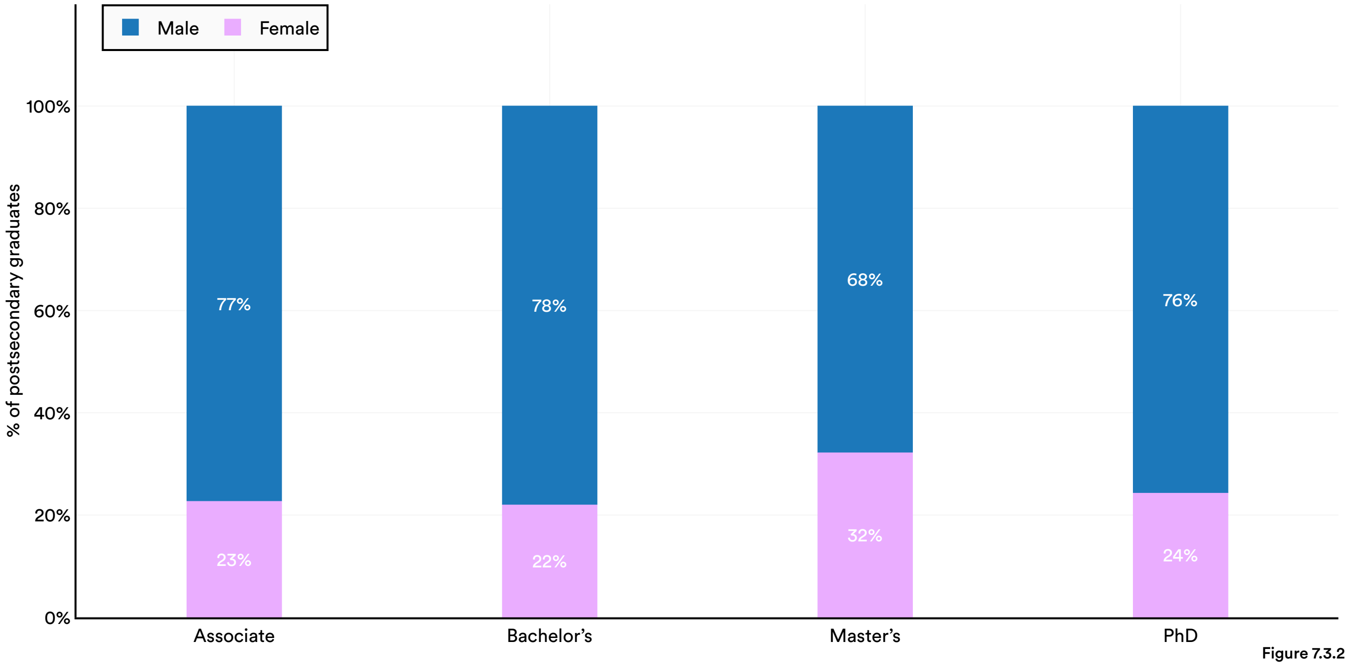


Figure 7.3.2

Black students account for 8% of bachelor's degrees, 8% of master's degrees, and 7% of PhDs in computing (Figure 7.3.3). Hispanic students account for 13% of bachelor's degrees, 8% of master's degrees, and 4% of PhDs in computing. By contrast, white students account for 46% of bachelor's degrees and over half (52%) of PhDs in computing; and Asian students are overrepresented in the postsecondary computing space, accounting for 23% of bachelor's degrees, 28% of master's degrees, and 17% of PhDs.

**CS vs. all postsecondary graduates in the United States by race/ethnicity (US residents only), 2023**

Source: National Center for Education Statistics' Integrated Postsecondary Education Data System, 2013–23 | Chart: 2025 AI Index report

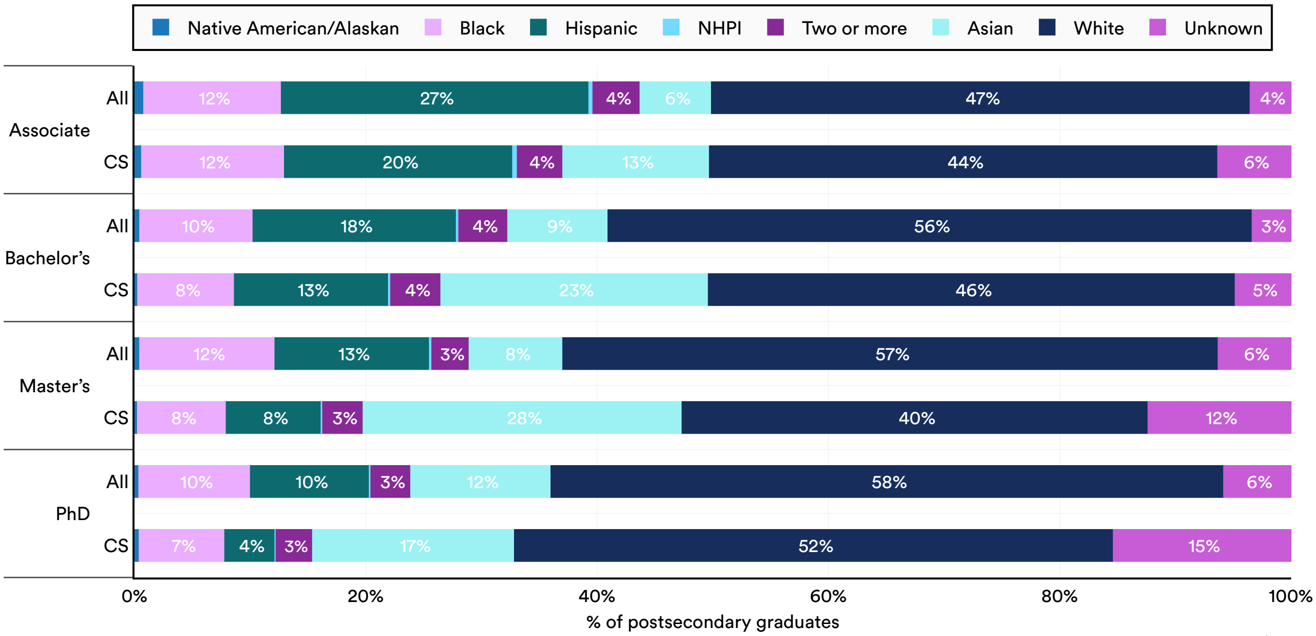


Figure 7.3.3

The majority of students in computing-related graduate programs are from countries outside of the U.S.—a percentage that has steadily grown over the years. In 2023, nonresidents accounted for 67% of master's degree graduates and 60% of PhD graduates. Between 2022 and 2023, international CS master's students increased more than twofold, growing from 15,811 to 34,850 (IPEDS). Students from India and China make up the vast majority of this graduate student body (93% of the 95,130 international master's students and 60% of the 13,070 international PhD students) (Figure 7.3.4 and Figure 7.3.5).

The number of institutions in the U.S. that offer an AI-specific bachelor's degree nearly doubled between 2022 and 2023, while the number of institutions offering an AI-specific master's degree has sharply increased as well (Figure 7.3.6).

### Number of international CS master's students enrolled in US universities, 2022

Source: National Science Board; National Science Foundation, 2023 | Chart: 2025 AI Index report

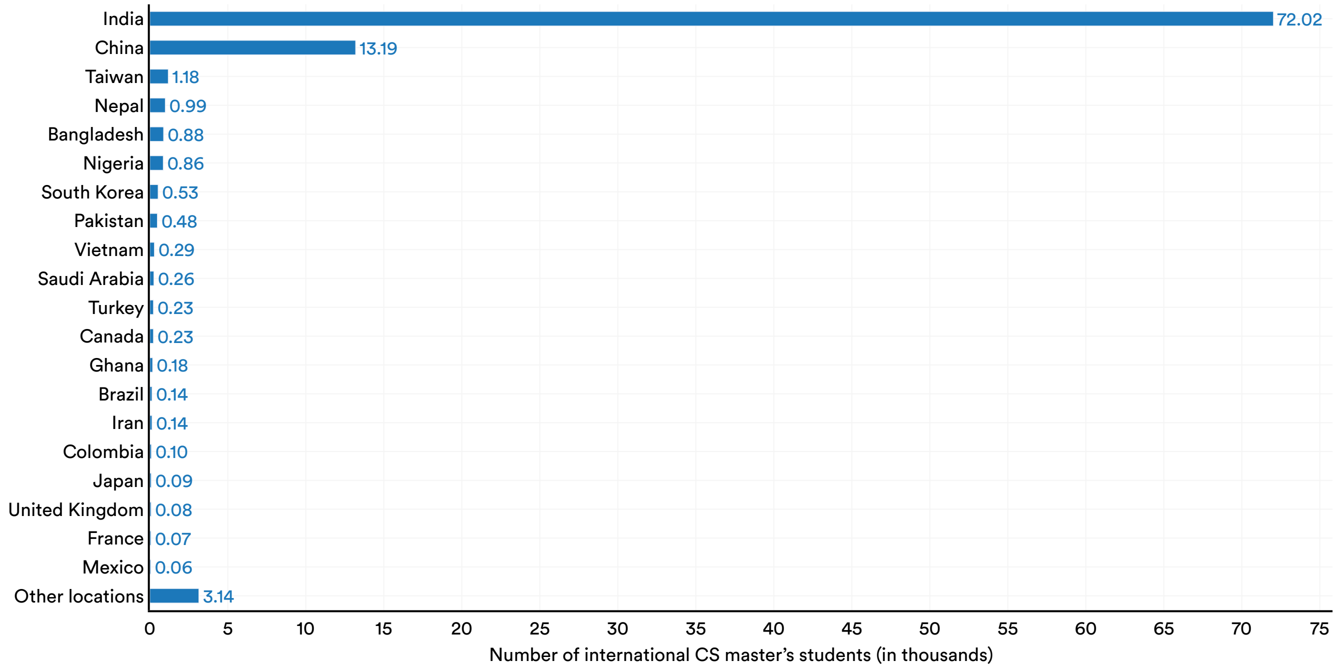


Figure 7.3.4

### Number of international CS PhD students enrolled in US universities, 2022

Source: National Science Board; National Science Foundation, 2023 | Chart: 2025 AI Index report

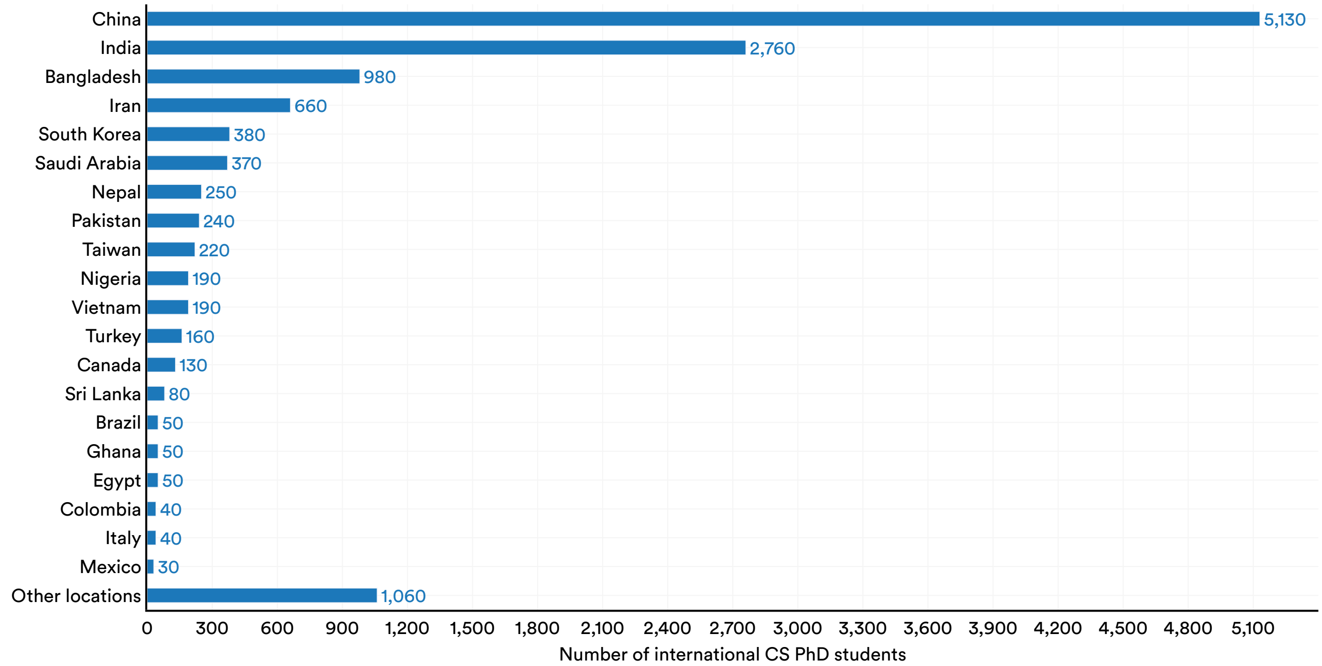


Figure 7.3.5

## Number of institutions offering AI bachelor's and master's degrees in the US, 2013–23

Source: National Center for Education Statistics' Integrated Postsecondary Education Data System, 2013–23 | Chart: 2025 AI Index report

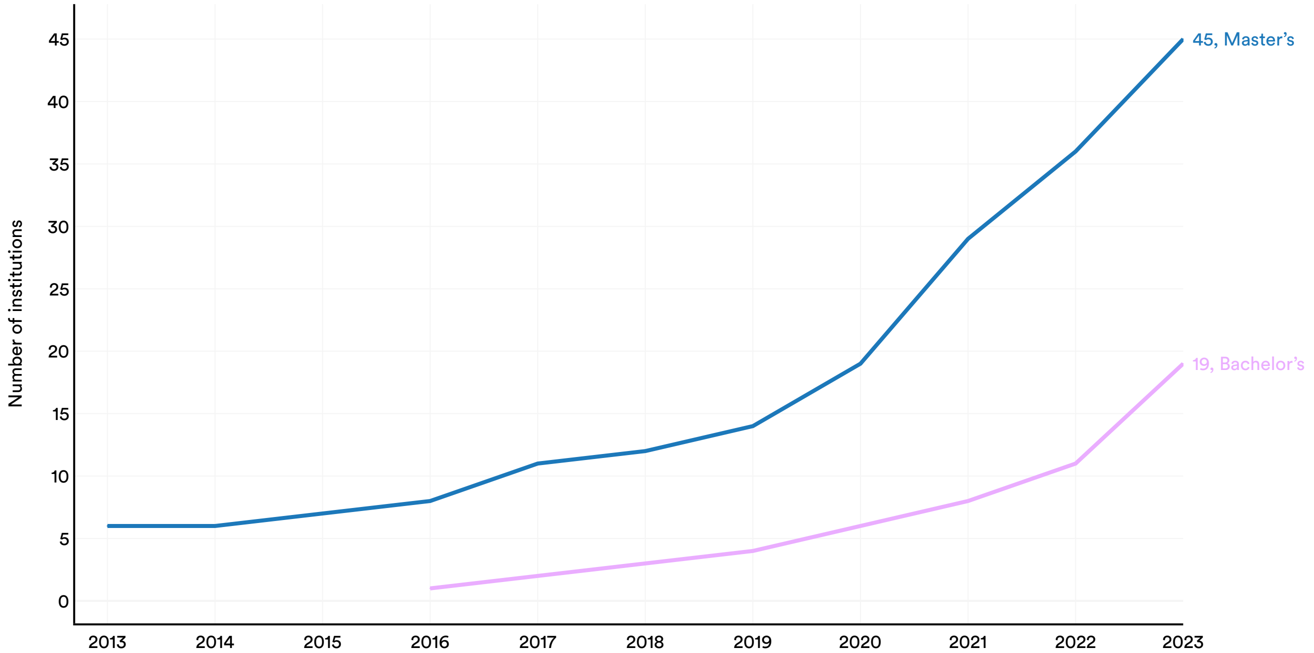


Figure 7.3.6

There was a sharp increase in students graduating with master's degrees in AI between 2022 and 2023 (Figure 7.3.7). Carnegie Mellon University, which graduated more AI majors than any other institution, doubled its number of graduates; meanwhile, Pennsylvania State University had its first graduating class in 2022 (Figure 7.3.8). Until recently, Carnegie Mellon was one of the only universities to offer dedicated programs in AI.

## New AI bachelor's and master's graduates in the United States, 2013–23

Source: National Center for Education Statistics' Integrated Postsecondary Education Data System, 2013–23 | Chart: 2025 AI Index report

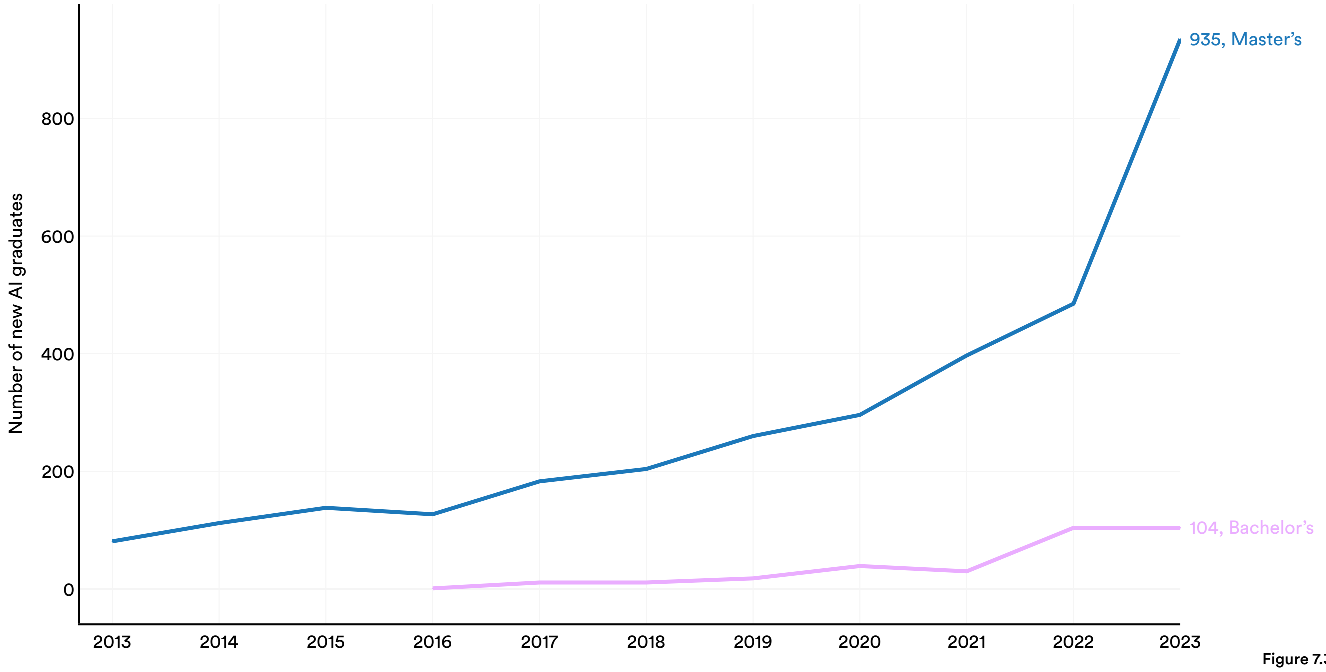


Figure 7.3.7

### Top postsecondary institutions graduating students in AI in 2023 by degree type[8]

**Source:** National Center for Education Statistics' Integrated Postsecondary Education Data System, 2023

| Graduates in AI Bachelor's Programs | |
|---|---|
| Carnegie Mellon University | 32 |
| Full Sail University | 19 |
| Concordia University Wisconsin | 16 |
| University of Advancing Technology | 10 |
| Pennsylvania State University-Main Campus | 7 |
| **Graduates in AI Master's Programs** | |
| Carnegie Mellon University | 178 |
| University of Pennsylvania | 98 |
| University of North Texas | 76 |
| Northeastern University | 55 |
| San Jose State University | 52 |
| **Graduates in AI PhD Programs** | |
| Carnegie Mellon University | 28 |
| Capitol Technology University | 4 |
| University of Pittsburgh-Pittsburgh Campus | 1 |

Figure 7.3.8

8 This list includes only universities that use the AI-specific CIP code for their programs, rather than general CS. However, many students studying AI worldwide are likely enrolled in broader CS programs.

## Global

No single dataset provides a fully standardized accounting of AI or CS postsecondary education across all countries. However, the Organization for Economic Cooperation and Development has compiled data covering its member countries and several non-OECD nations.[9] The International Standard Classification of Education is used to compare education statistics relied on by the OECD to evaluate global progress. Information and communications technologies, or ICT, includes such areas of study as "informatics, information and communication technologies, or CS. These subjects include a wide range of topics concerned with the new technologies used for the processing and transmission of digital information, including computers, computerised networks (including the Internet), microelectronics, multimedia, software and programming."

The U.S. remains a global leader in ICT-related fields, producing more graduates at each of the associate, bachelor's, master's, and PhD levels than any other country included in the sample (Figures 7.3.9 to 7.3.12). Notably, the U.S. graduates more than twice as many associate, master's, and PhD students—and nearly twice as many bachelor's students—as the next highest country (Figure 7.3.9).

**New ICT short-cycle tertiary graduates by country, 2022**
Source: OECD, 2022 | Chart: 2025 AI Index report

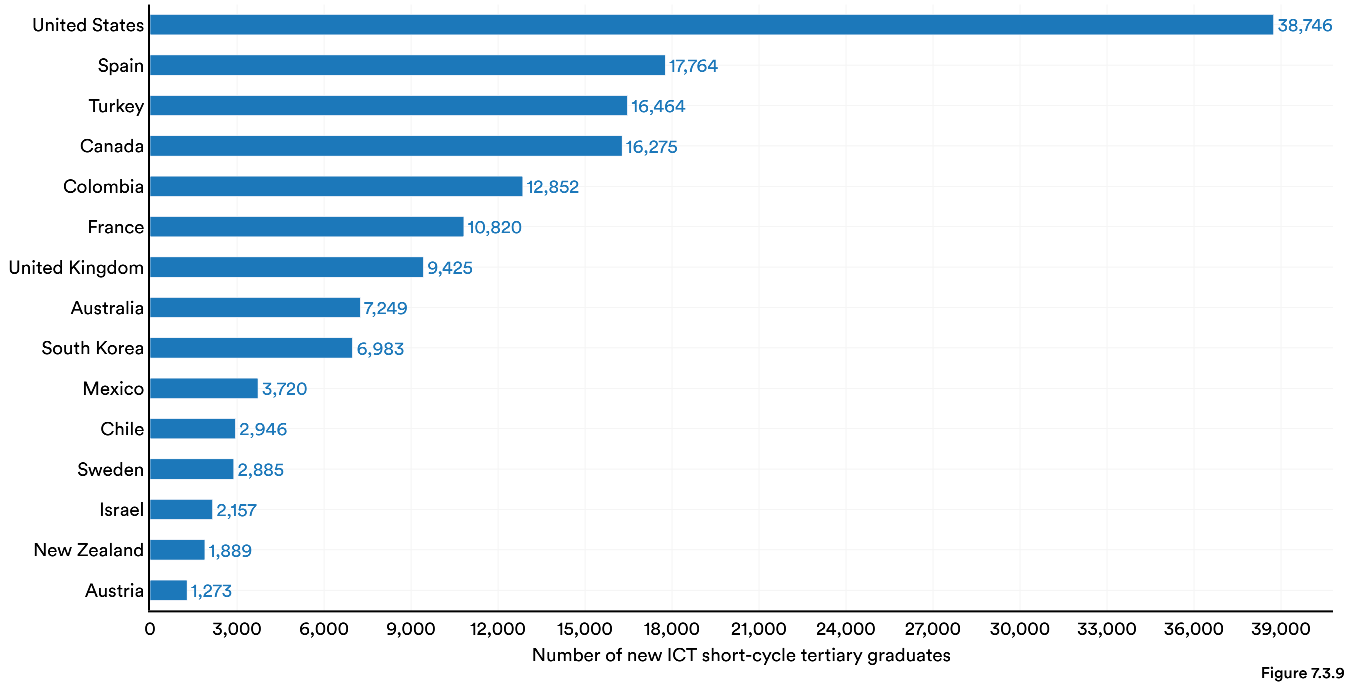


Figure 7.3.9

9 While this dataset provides insights across some country lines, it omits a number of countries likely to have large numbers of ICT graduates. The exclusion of India, China, and countries in Africa highlights the need for global standardized data collection to ensure inclusion of countries that have made significant investments in computing education and make up a significant proportion of the global majority. There is also a significant lag in collecting and reporting global data on education; as a result, the most recent year for which data is available is 2022.

## New ICT bachelor's graduates by country, 2022

Source: OECD, 2022 | Chart: 2025 AI Index report

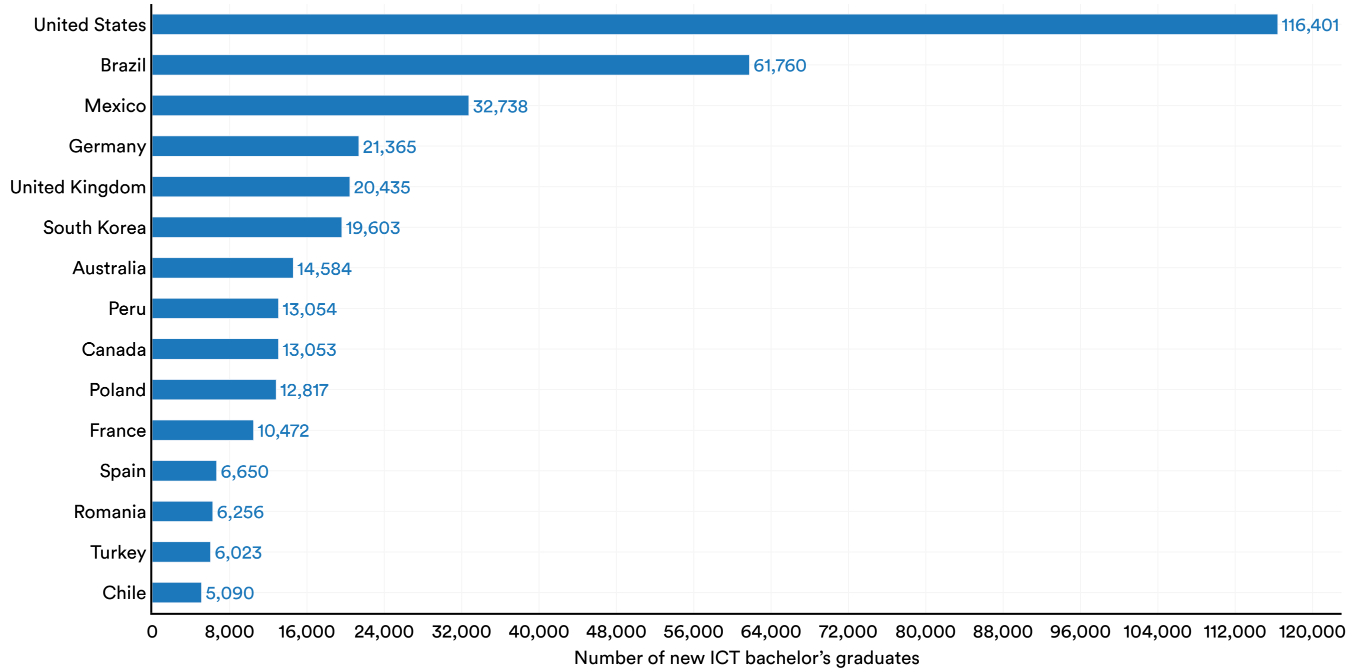


Figure 7.3.10

## New ICT master's graduates by country, 2022

Source: OECD, 2022 | Chart: 2025 AI Index report

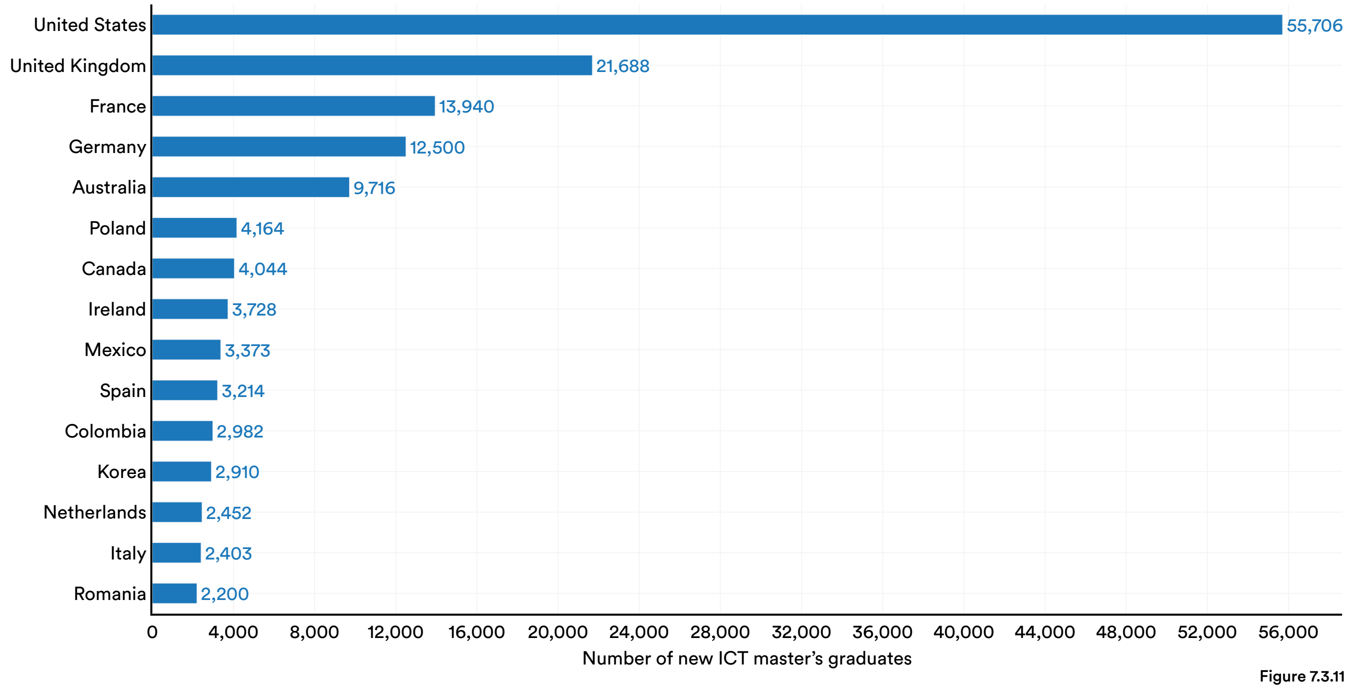


Figure 7.3.11

### New ICT PhD graduates by country, 2022

Source: OECD, 2022 | Chart: 2025 AI Index report

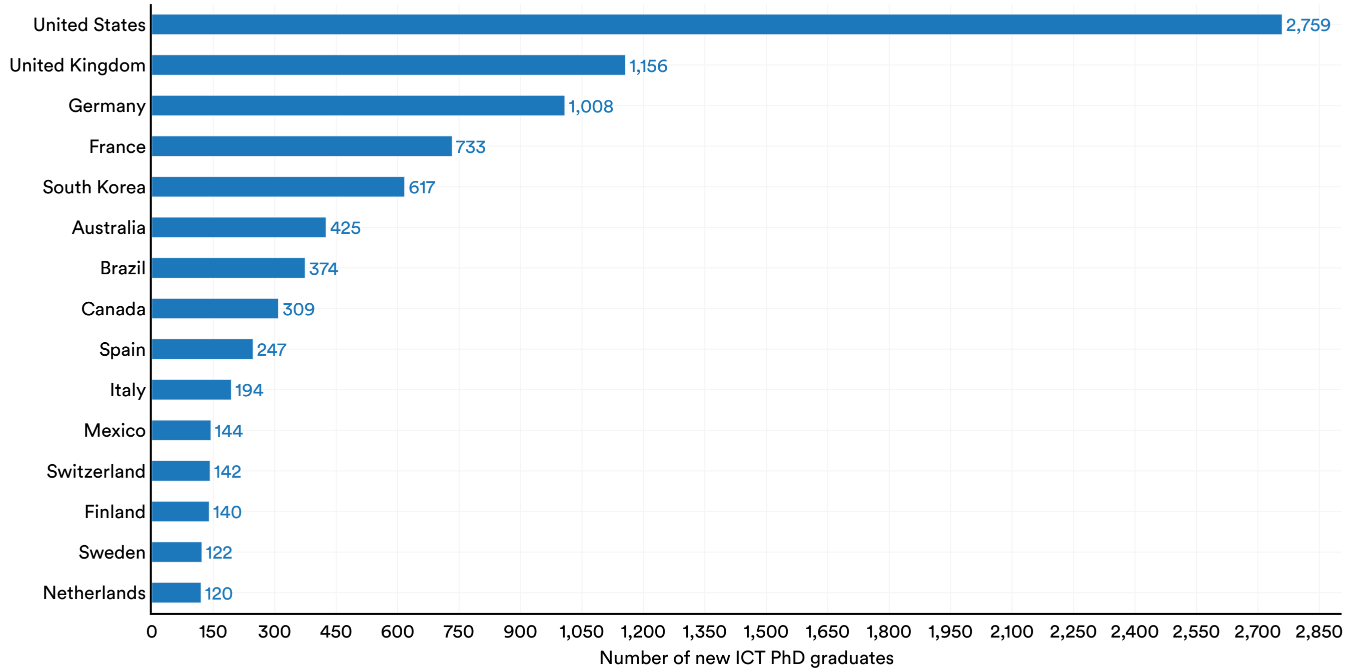


Figure 7.3.12

Gender parity in AI-related fields continues to be a challenge globally (Figure 7.3.13). On average, women comprise approximately one-quarter of ICT postsecondary graduates at the associate, bachelor's, and PhD levels. Women fare slightly better at the master's level, comprising closer to one-third of graduates. Turkey is among the countries that fare best with respect to gender parity, with women there comprising at least half of all graduates at the associate, bachelor's, master's, and PhD levels.

### Percentage of new ICT postsecondary graduates who are female by country, 2022

Source: OECD, 2022 | Chart: 2025 AI Index report

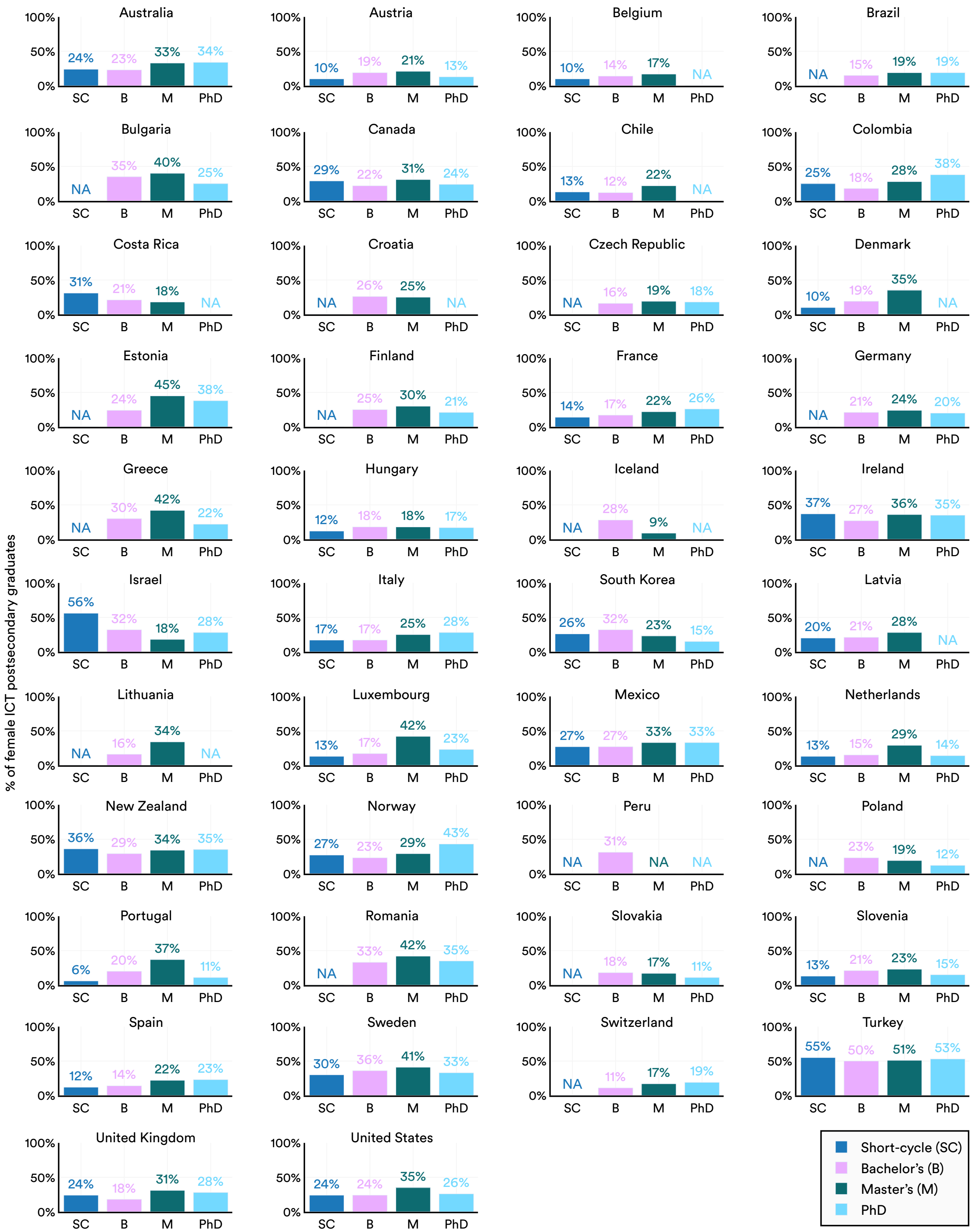


Figure 7.3.13

## Guidance

Most existing university policies and guidance around AI pertain to how students use AI for assignments; guidance on AI education itself tends to be relegated to the department level (primarily in computing departments).

AI is being used across campuses by both students and faculty at high rates: 86% of students use AI in their studies, and 61% of faculty use AI in their teaching. Yet the guidelines around usage still lack clarity and standardization across universities. As of early 2025, 39% of institutions have an AI-related acceptable use policy, an increase of 16 percentage points from 2024. Larger universities (10,000-plus students) are more likely to have a policy than smaller institutions (fewer than 5,000 students). Although teaching and learning policies are the most impacted by AI, almost all institutional policies are affected by technology policies (e.g., purchasing AI tools using university resources, respecting intellectual property/copyright laws, using AI to create malware or viruses)—from cybersecurity and data privacy to online learning and data and analytics.

In addition to the K–12 guidance UNESCO provided in the 2019 Beijing Consensus on Artificial Intelligence and Education, it offered specific guidance that is relevant for both K–12 and postsecondary settings with an eye toward achieving the Education 2030 agenda goals via AI technologies. The 2019 report includes five implementation and policy guidelines pertaining to AI education in postsecondary settings.

# 7.4 Looking Ahead

The intentional design of an equitable AI educational ecosystem will be critical for the responsible development and deployment of future technological innovations. The current systems in which AI has proliferated have led to detrimental outcomes, such as mis/disinformation campaigns to influence national political outcomes, development of AI-enabled weapons, and infringement of copyright-protected intellectual property. The pressing need to prioritize a better approach to building AI is evident. To do so, it is necessary to reimagine an educational program where AI competencies, inclusive of building a lens interrogating the ethics of AI in addition to technical creation, are seen as core to preparing students for a technology-powered future. There are already CS-based infrastructure, policies, and implementation strategies that offer opportunities to integrate AI education more seamlessly. As AI innovations rapidly evolve, transforming education is urgent so that future creators of these technologies are made aware of potential harms and have the competencies to mitigate negative impacts. Academic institutions around the world must continue to progress (and monitor their progress) on creating AI pathways, adopt policies to expand access to relevant courses, and implement strategies to upskill the educator workforce and engage students to participate and build competencies equitably.

# Appendix

## Code.org, CSTA, ECEP Alliance

***State-Level Data***

Appendix 2 of the State of Computer Science Education 2024 report includes a full description of the methodology used by Code.org, CSTA, and ECEP Alliance to collect their data. The staff at Code.org also maintains a database of the state of American K–12 education and, in this policy primer, provides a greater amount of detail on the state of American K–12 education in each state.

***AP Computer Science Data***

The AP Computer Science data is provided to Code.org as per an agreement the College Board maintains with Code.org. The AP Computer Science data comes from the College Board's national and state summary reports.

***Access to Computer Science Education***

Data on access to computer science education was drawn from Code.org, CSTA, and ECEP Alliance's State of Computer Science Education 2024 report.

## 2024 K-12 Computer Science Landscape Teacher Landscape Survey

For more information or access to the dataset, please contact membership@csteachers.org.

## State Standards Comparison

CSTA and the Institute for Advancing Computing Education (IACE) published a State Standards Comparison report in December 2024. The dataset of approximately 10,000 state-adopted K-12 standards is available as a spreadsheet, as well as a Python notebook that may be useful for data analysis. Colorado and Virginia's standards were adopted in late 2024 and are not included in this dataset.

## Global K-12 AI Education

The Raspberry Pi Computing Education Research Centre, based in the Department of Computer Science and Technology at the University of Cambridge, compiled this dataset, expanding on research conducted by the Brookings Institution for its 2021 report Building Skills for Life: How to Expand and Improve Computer Science Education Around the World. We made one change to their dataset to clarify that CS in the United States is available in some schools/districts and not available everywhere as an elective course. For more information about the methodology, please refer to their report.

## IPEDS

The Integrated Postsecondary Education Data System (IPEDS) combines annual surveys conducted by the U.S. Department of Education's National Center for Education Statistics (NCES). IPEDS gathers information from every college, university, and technical and vocational institution that participates in federal student financial aid programs.

***Completion Data***

This chapter used data from the Completions survey, which collects data on the number of students who complete a postsecondary education program. Graduates in AI-related fields were identified as those whose first major was either Computer and Information Sciences, General (11.01); Computer Programming (11.02); or Computer Science (11.07), according to the Classification of Instructional Programs (CIP) codes. The number of graduates in AI-related fields included in this year's report differs from previous years because the AI Index used multiple CIP codes.

## OECD

This chapter used data from the OECD Data Explorer, specifically from the table "Number of enrolled students, graduates and new entrants by field of education." The methodology for this dataset can be found in Education at a Glance 2024 Sources, Methodologies and Technical Notes.