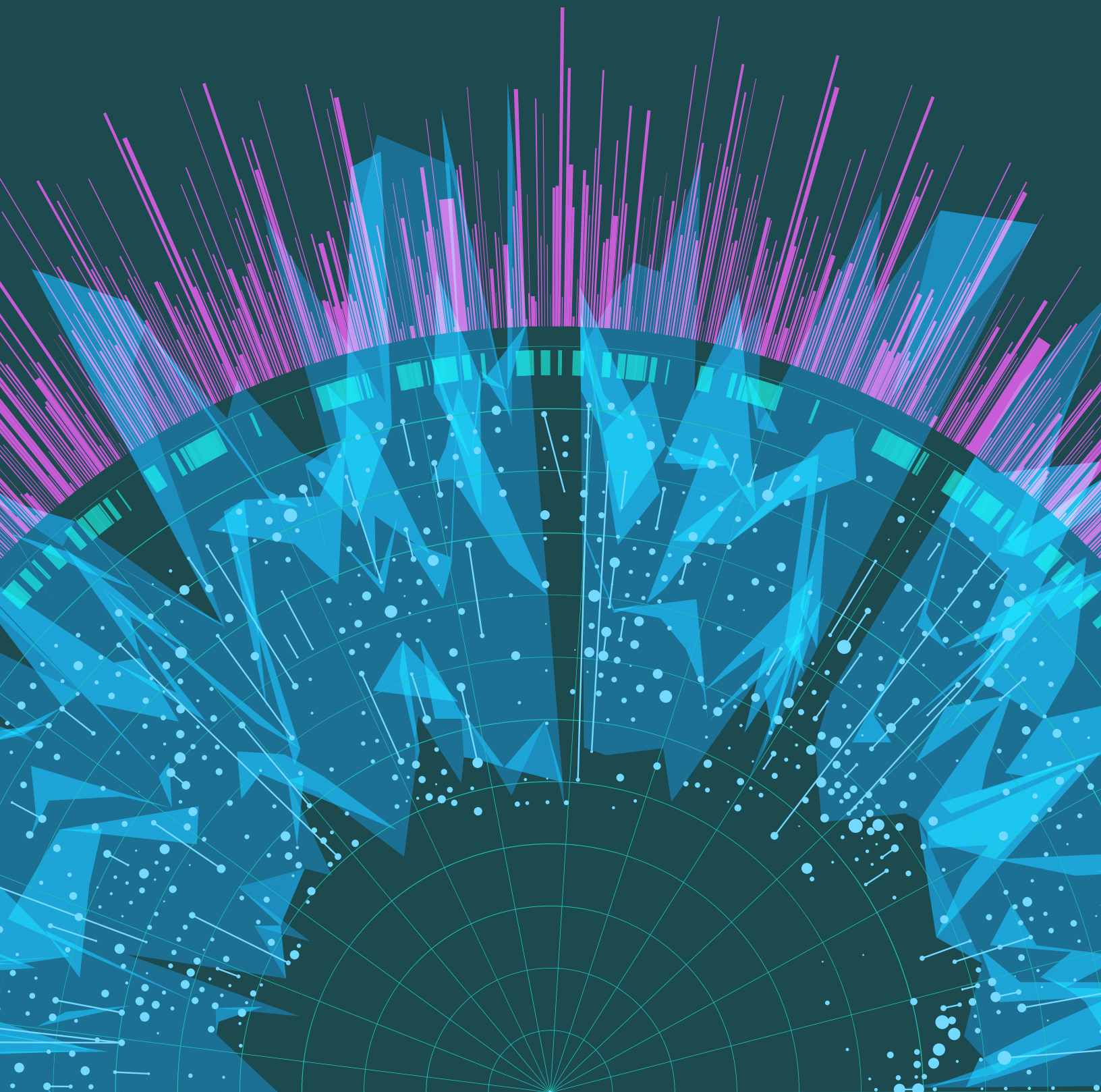
CHAPTER 6:
Education



Preview

ACCESS THE PUBLIC DATA

Overview

This chapter examines trends in AI and computer science (CS) education, focusing on who is learning, where they are learning, and how these trends have evolved over time. Amid growing concerns about AI's impact on education, it also investigates the use of new AI tools like ChatGPT by teachers and students.

The analysis begins with an overview of the state of postsecondary CS and AI education in the United States and Canada, based on the Computing Research Association's annual Taulbee Survey. It then reviews data from Informatics Europe regarding CS education in Europe. This year introduces a new section with data from Studyportals on the global count of AI-related English-language study programs.

The chapter wraps up with insights into K–12 CS education in the United States from Code.org and findings from the Walton Foundation survey on ChatGPT's use in schools.

Chapter Highlights

1. The number of American and Canadian CS bachelor's graduates continues to rise, new CS master's graduates stay relatively flat, and PhD graduates modestly grow. While the number of new American and Canadian bachelor's graduates has consistently risen for more than a decade, the number of students opting for graduate education in CS has flattened. Since 2018, the number of CS master's and PhD graduates has slightly declined.

2. The migration of AI PhDs to industry continues at an accelerating pace. In 2011, roughly equal percentages of new AI PhDs took jobs in industry (40.9%) and academia (41.6%). However, by 2022, a significantly larger proportion (70.7%) joined industry after graduation compared to those entering academia (20.0%). Over the past year alone, the share of industry-bound AI PhDs has risen by 5.3 percentage points, indicating an intensifying brain drain from universities into industry.

3. Less transition of academic talent from industry to academia. In 2019, 13% of new AI faculty in the United States and Canada were from industry. By 2021, this figure had declined to 11%, and in 2022, it further dropped to 7%. This trend indicates a progressively lower migration of high-level AI talent from industry into academia.

4. CS education in the United States and Canada becomes less international. Proportionally fewer international CS bachelor's, master's, and PhDs graduated in 2022 than in 2021. The drop in international students in the master's category was especially pronounced.

5. More American high school students take CS courses, but access problems remain. In 2022, 201,000 AP CS exams were administered. Since 2007, the number of students taking these exams has increased more than tenfold. However, recent evidence indicates that students in larger high schools and those in suburban areas are more likely to have access to CS courses.

6. AI-related degree programs are on the rise internationally. The number of English-language, AI-related postsecondary degree programs has tripled since 2017, showing a steady annual increase over the past five years. Universities worldwide are offering more AI-focused degree programs.

7. The United Kingdom and Germany lead in European informatics, CS, CE, and IT graduate production. The United Kingdom and Germany lead Europe in producing the highest number of new informatics, CS, CE, and information bachelor's, master's, and PhD graduates. On a per capita basis, Finland leads in the production of both bachelor's and PhD graduates, while Ireland leads in the production of master's graduates.

This section provides an overview of postsecondary education in CS and AI, highlighting graduation statistics across North America and Europe for various degrees including bachelor's, master's, and PhDs. It also covers information on AI-related courses offered in English.

6.1 Postsecondary CS and AI Education

United States and Canada

This subsection presents an analysis of data from the Computing Research Association's Taulbee Survey, which evaluates the state of CS and AI postsecondary education in the United States and Canada. The survey covers 297 PhD-granting CS departments across the United States and Canada.[1]

CS Bachelor's Graduates

Over the past decade, the total number of new CS bachelor's graduates in North America has steadily risen, increasing more than threefold, with a 7.9% year-over-year rise from 2021 to 2022 (Figure 6.1.1).

New CS bachelor's graduates in the United States and Canada, 2010–22

Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

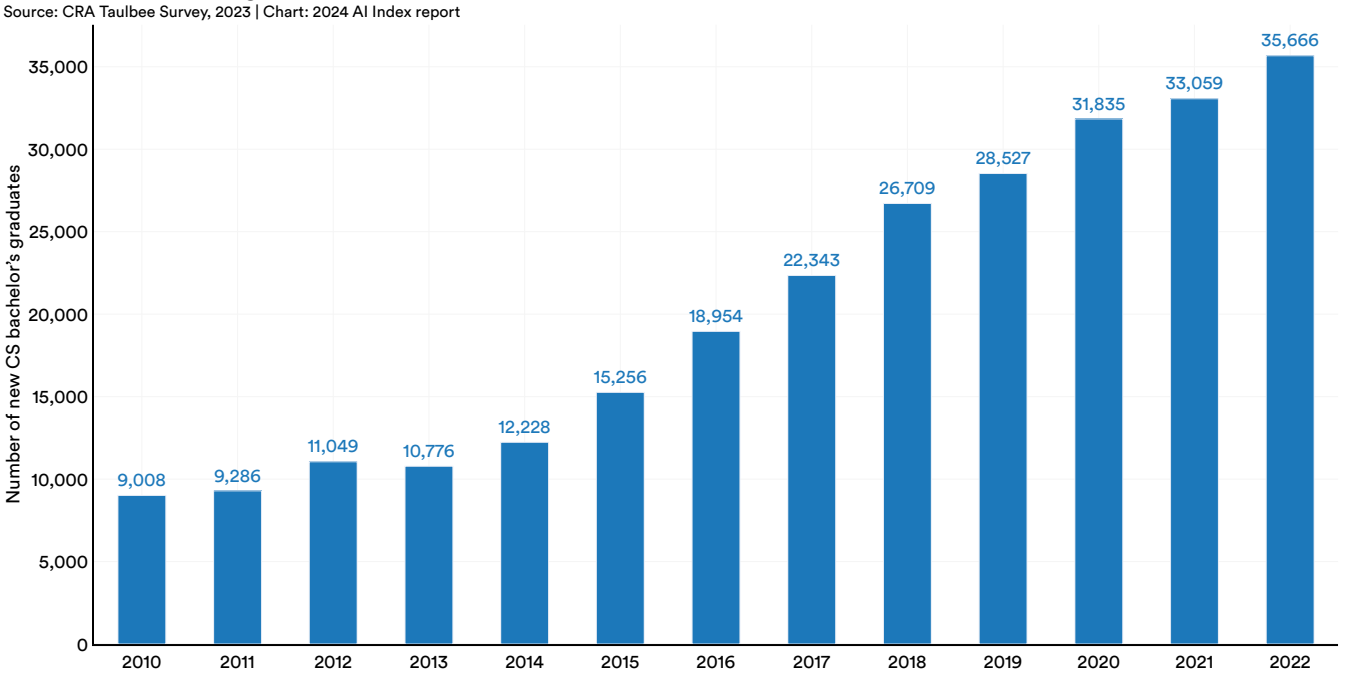


Figure 6.1.1

1 It is important to note that not all PhD-granting departments targeted in the survey provided responses. Out of the 297 departments targeted, only 182 responded, yielding an overall response rate of 61%.

For the first time in almost eight years, the proportion of international students among CS bachelor's graduates in American and Canadian universities declined, falling from 16.3% in 2021 to 15.2% in 2022 (Figure 6.1.2). This decline likely reflects the increased difficulty of obtaining study visas during the early years of the Trump administration, an impact that is only now beginning to manifest in the data. The decline is also partially attributable to international travel restrictions that were imposed during the COVID-19 pandemic, affecting the ability of international students to study in the United States and Canada. Despite this recent drop, the overall trend over the last decade shows a steady increase in the proportion of international students.

New international CS bachelor's graduates (% of total) in the United States and Canada, 2010–22
Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

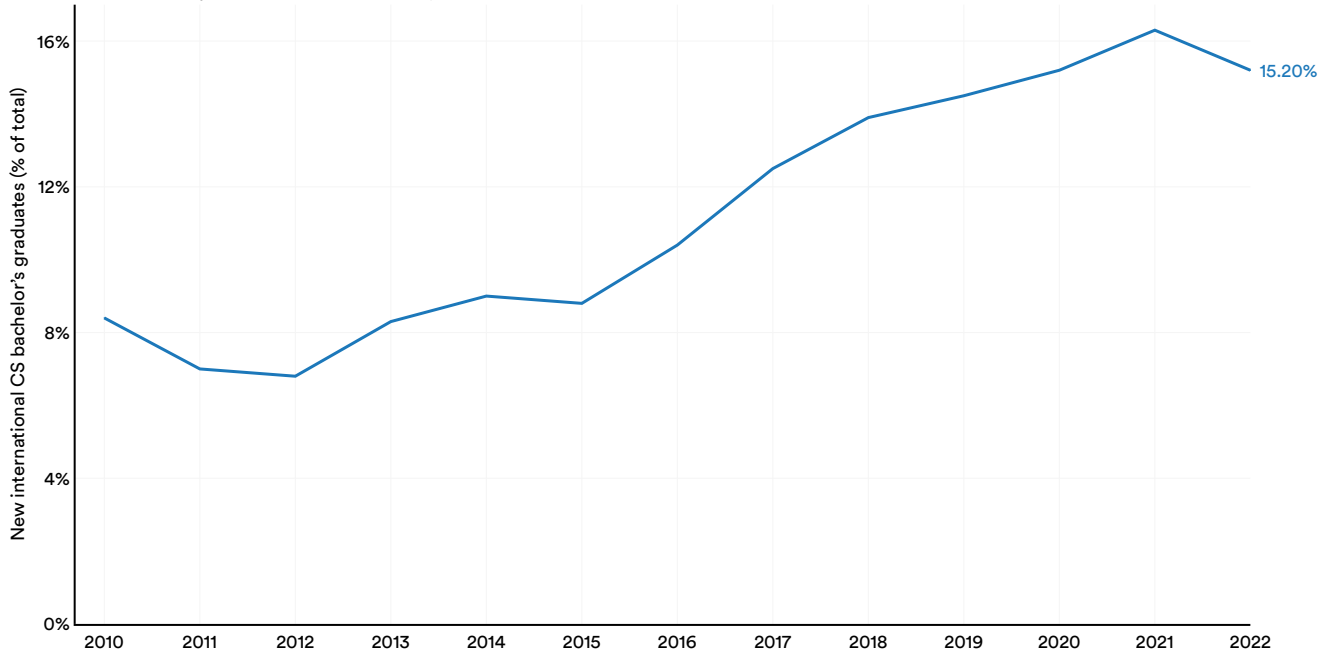


Figure 6.1.2

CS Master's Graduates

AI courses are commonly included in CS master's degree programs. While the total number of new CS master's graduates from American and Canadian universities more than doubled over the past decade, the number appears to have leveled out since 2018 and slightly decreased, by 2.5%, last year (Figure 6.1.3). This leveling is a reflection of the decline in international master's students shown in the following graph.

New CS master's graduates in the United States and Canada, 2010–22

Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

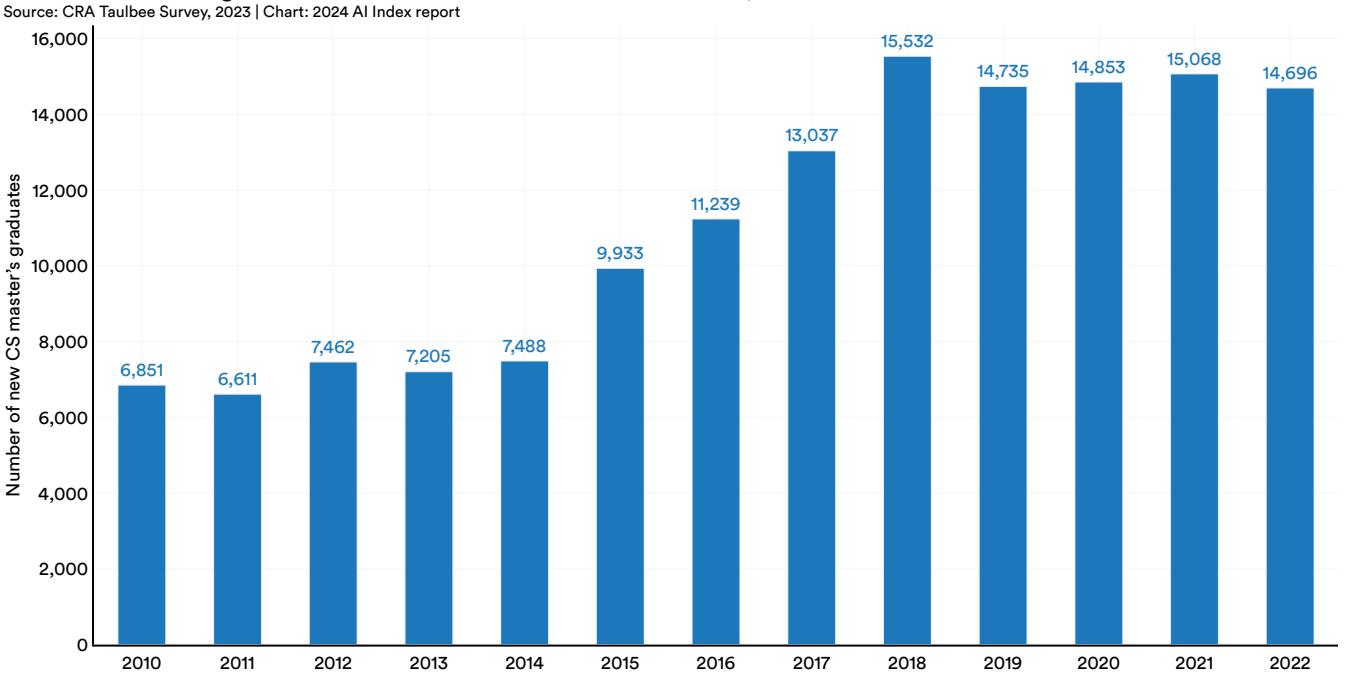


Figure 6.1.3

In 2022, American and Canadian universities experienced a notable decrease in international CS master's students. This downward trend began around 2017, but the decline was most pronounced last year, at 14.8 percentage points (Figure 6.1.4). Currently, the split between international and domestic CS master's graduates is roughly even.

New international CS master's graduates (% of total) in the United States and Canada, 2010–22

Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

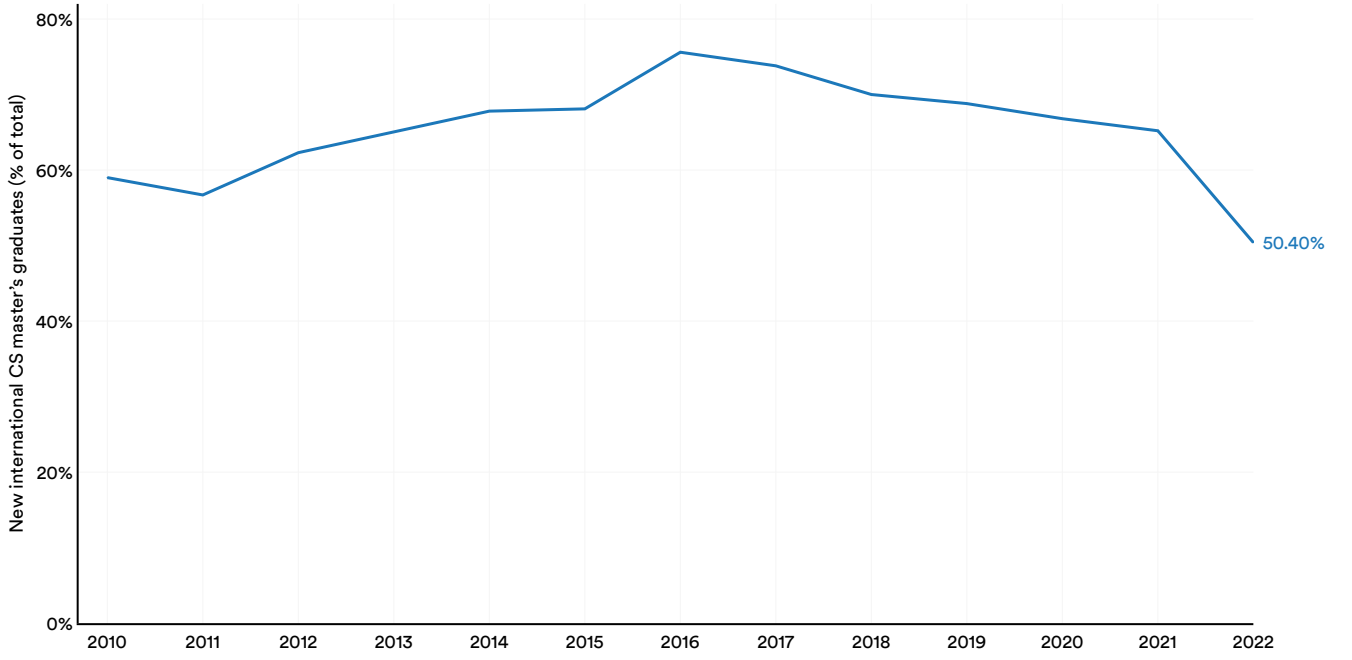


Figure 6.1.4

CS PhD Graduates

For the first time in a decade, there has been a significant increase in the number of new CS PhD graduates at American and Canadian universities. In 2022, the number of CS PhD graduates reached 2,105, the highest since 2010 (Figure 6.1.5).

New CS PhD graduates in the United States and Canada, 2010–22

Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

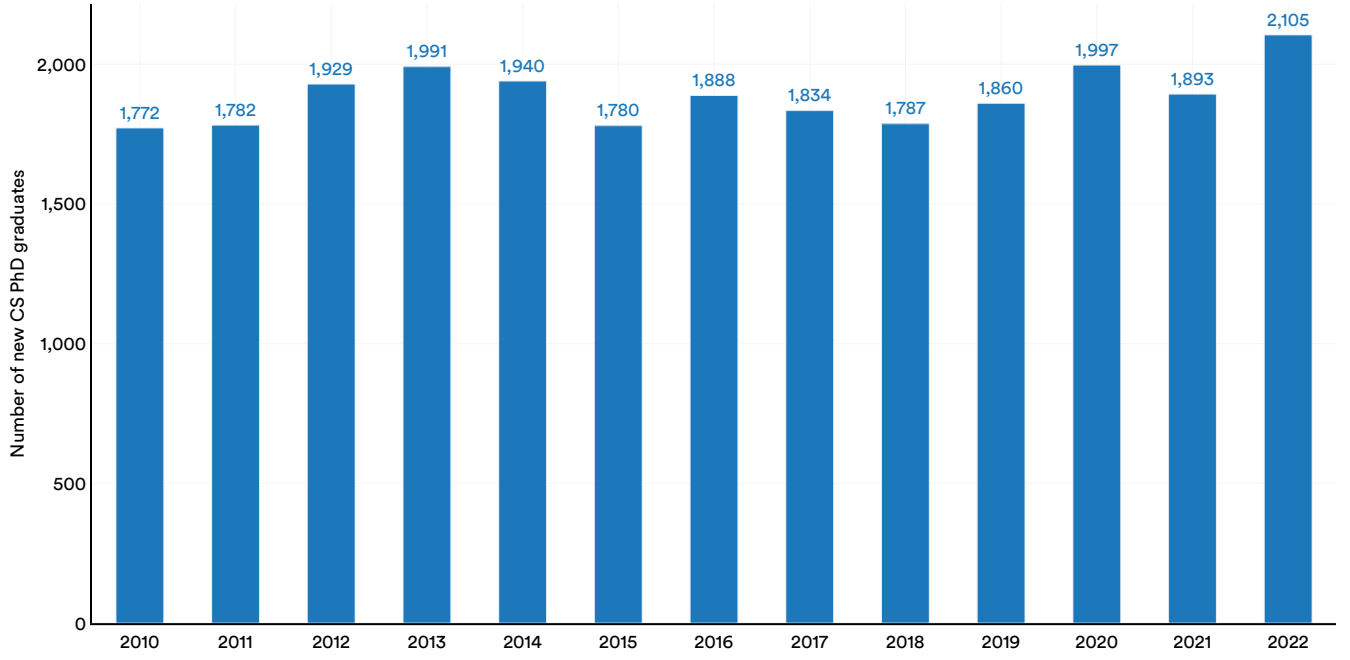


Figure 6.1.5

While the proportion of international students among CS PhD graduates has risen over the past decade, there was a slight decrease in this proportion in the last year, dropping from 68.6% in 2021 to 65.9% in 2022 (Figure 6.1.6).

New international CS PhD graduates (% of total) in the United States and Canada, 2010–22

Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

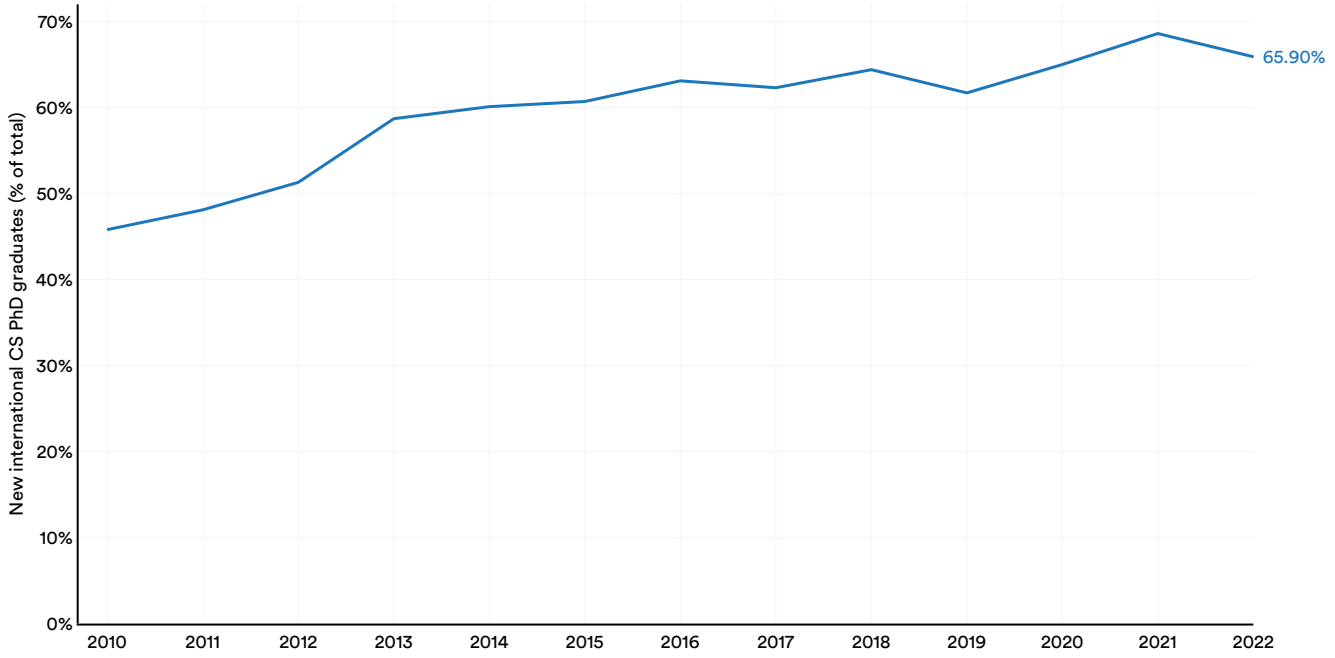


Figure 6.1.6

Where do newly minted AI PhDs choose to work after graduating? Following a trend highlighted in last year's AI Index report, a growing share of AI doctoral recipients are pursuing careers in industry (Figure 6.1.7 and Figure 6.1.8). In 2011, around the same percentage took jobs in industry (40.9%) as in academia (41.6%).

However, by 2022, a significantly larger proportion (70.7%) joined industry after graduation compared to those entering academia (20.0%). The percentage of new AI PhDs going into government roles has remained relatively low and steady at around 0.7% over the past five years.

Employment of new AI PhDs (% of total) in the United States and Canada by sector, 2010–22
Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

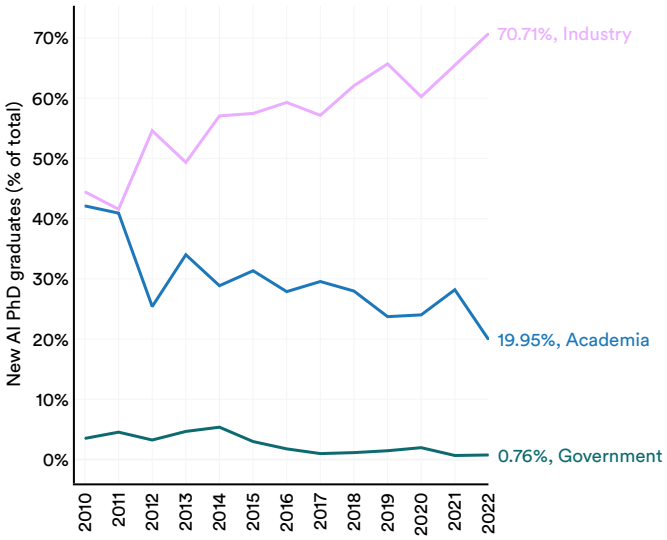


Figure 6.1.7[2]

Employment of new AI PhDs in the United States and Canada by sector, 2010–22
Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

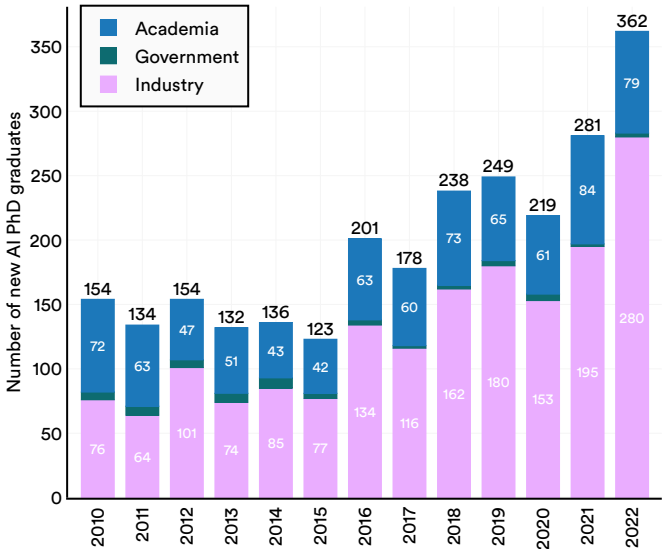


Figure 6.1.8

2 The sums in Figure 6.1.7 do not add up to 100, as there is a subset of new AI PhDs each year who become self-employed, unemployed, or report an "other" employment status in the CRA survey. These students are not included in the chart.

CS, CE, and Information Faculty

To better understand trends in CS and AI education, it is helpful to examine data on CS faculty. Last year, the total number of CS, CE, and information faculty in American and Canadian universities increased 7.2% (Figure 6.1.9). Since 2011, the increase is 42.4%.

Number of CS, CE, and information faculty in the United States and Canada, 2011–22

Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

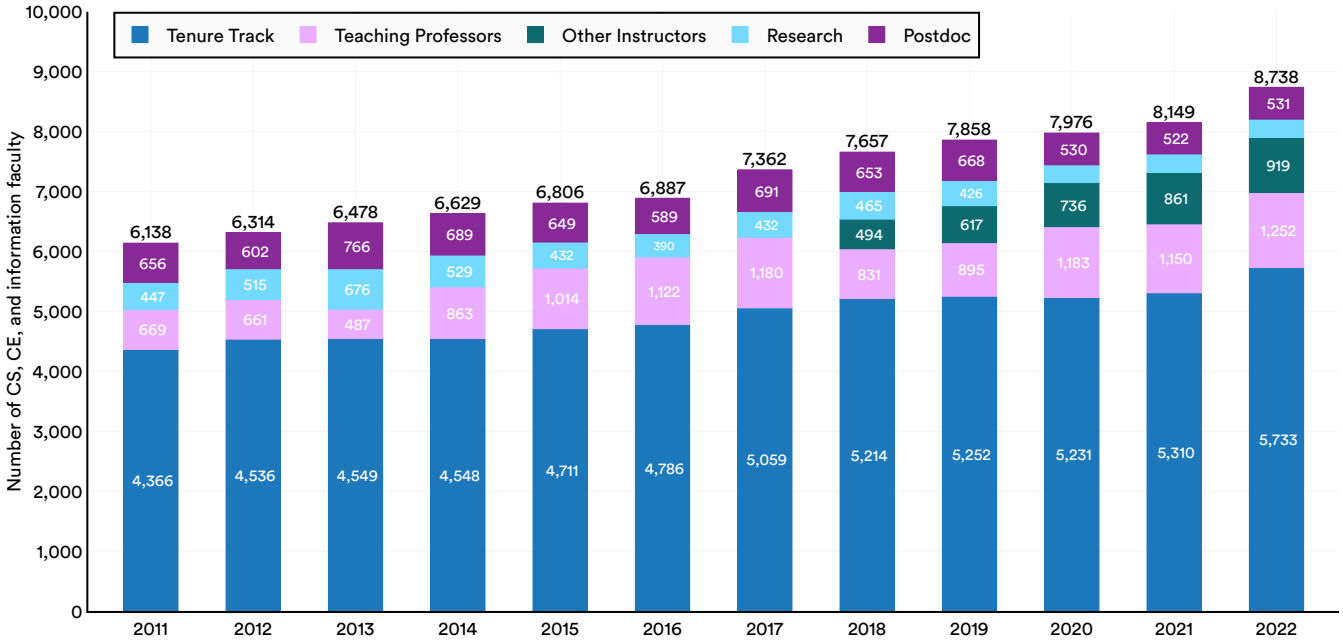


Figure 6.1.9

In 2022, the United States had 7,084 CS faculty members, with the majority (65.7%) on the tenure track (Figure 6.1.10). The total number of American CS faculty has risen 4.4% since 2021 and 45.0% since 2011.

Number of CS faculty in the United States, 2011–22
Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

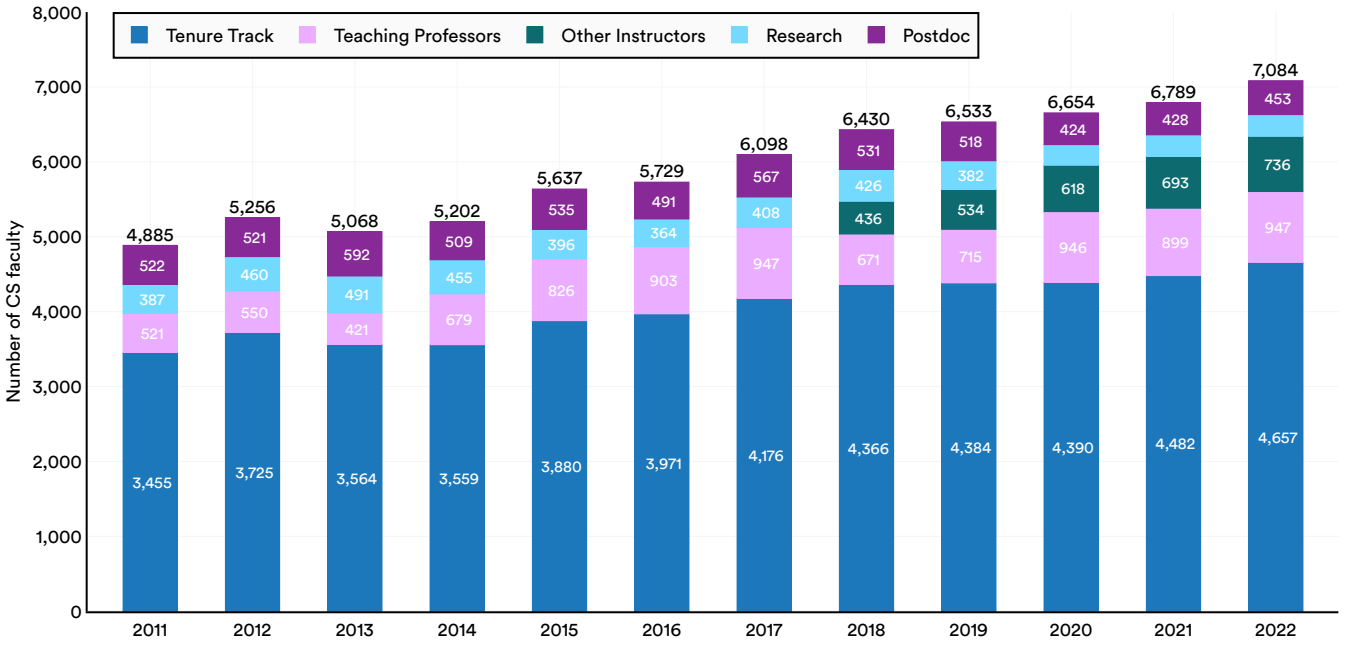


Figure 6.1.10

Last year, 915 new faculty were hired across CS, CE, and information disciplines in North America, a decade high. 455 of these positions were tenure track. (Figure 6.1.11).

New CS, CE, and information faculty hires in the United States and Canada, 2011–22

Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

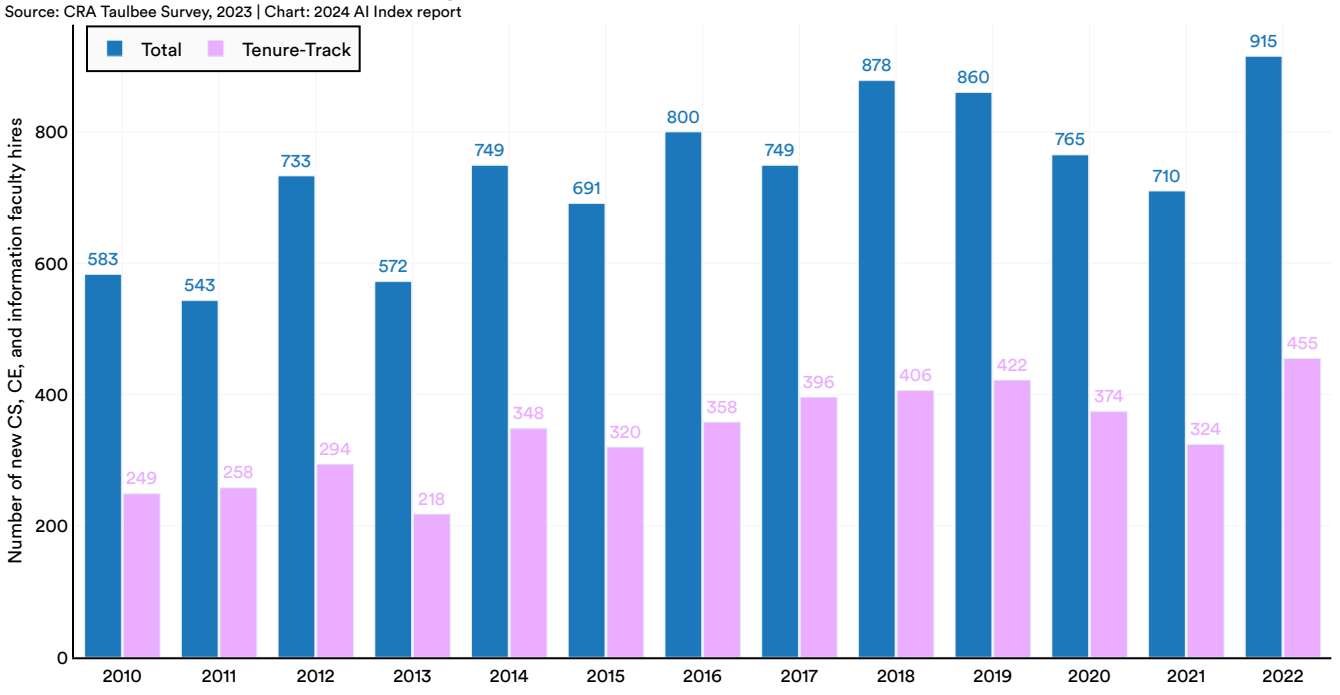


Figure 6.1.11

In 2022, 43% of new faculty appointments came from other academic positions, indicating a "churn" within the academic workforce (Figure 6.1.12). Since these "new" faculty members vacated positions elsewhere, their previous roles will eventually need to be filled. Additionally, the proportion of faculty transitioning from industry in 2022 fell to 7% from 11% in the previous year and 13% in 2019.

Source of new faculty in American and Canadian CS, CE, and information departments, 2018–22
Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

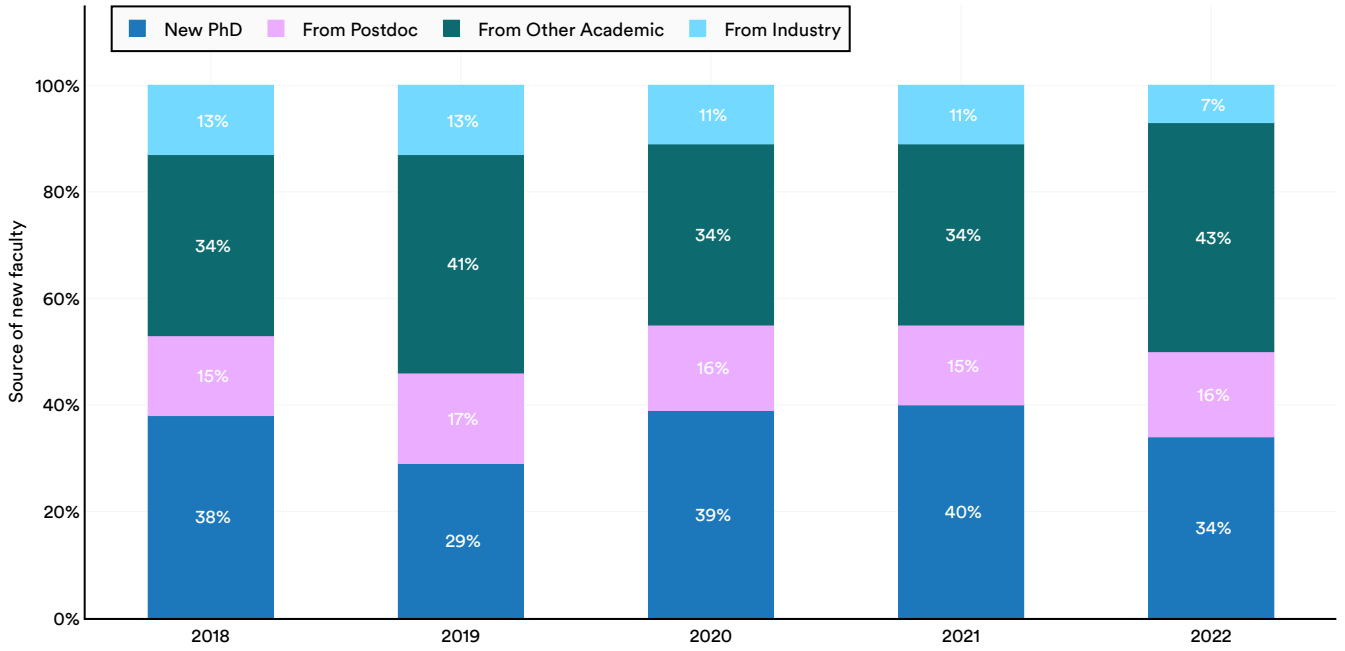


Figure 6.1.12

The reasons for faculty positions remaining unfilled have varied over the past decade. In 2011, 37% of failed searches were due to no offer being made, while 34% were because the offer made was declined (Figure 6.1.13). In contrast, in 2022, only 15% ended with no offer being made, while 55% involved offers that were turned down. This trend appears to reflect an increasingly competitive market for new CS faculty. However, it remains unclear whether this indicates heightened competition with other academic positions or with industry positions.

Reason why new CS, CE, and information faculty positions remained unfilled (% of total), 2011–22
Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

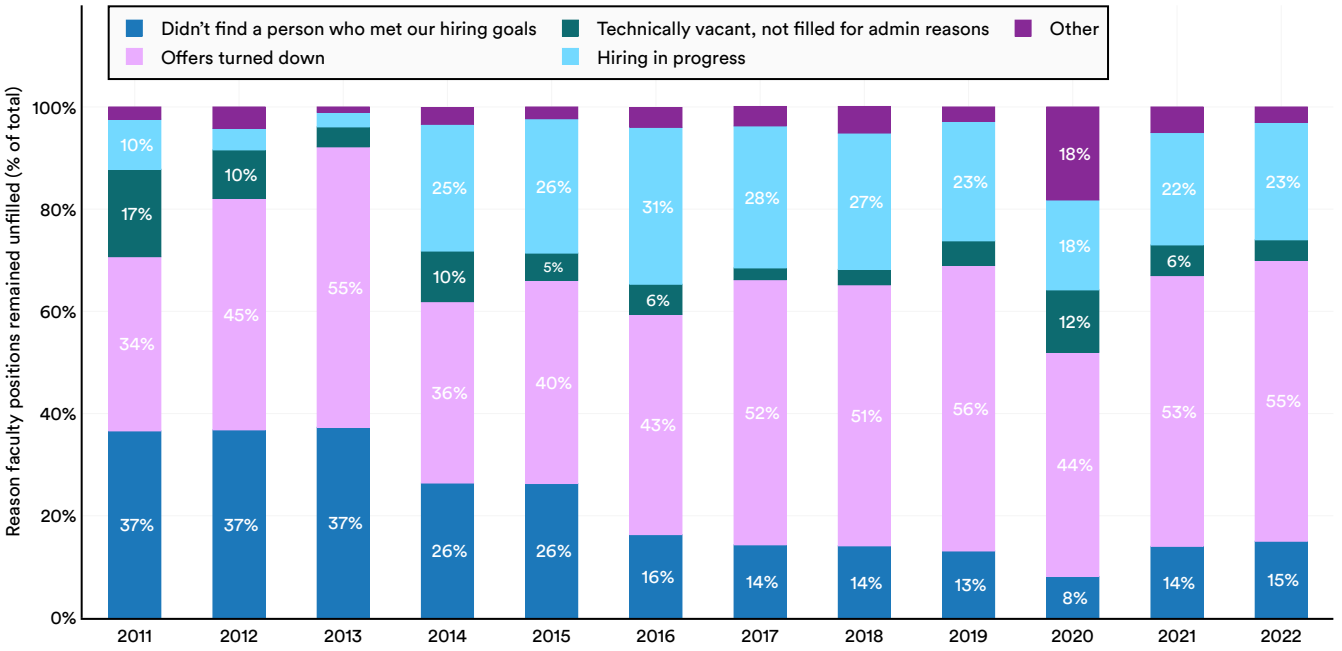


Figure 6.1.13

In 2022, North American departments in CS, CE, and information disciplines experienced a significant increase in faculty departures, totaling 405, compared to 303 in 2021 (Figure 6.1.14). Of these losses, 38.5% left for other academic positions, while 16.3% moved to nonacademic roles, maintaining a trend consistent with previous years.

Faculty losses in American and Canadian CS, CE, and information departments, 2011–22
Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

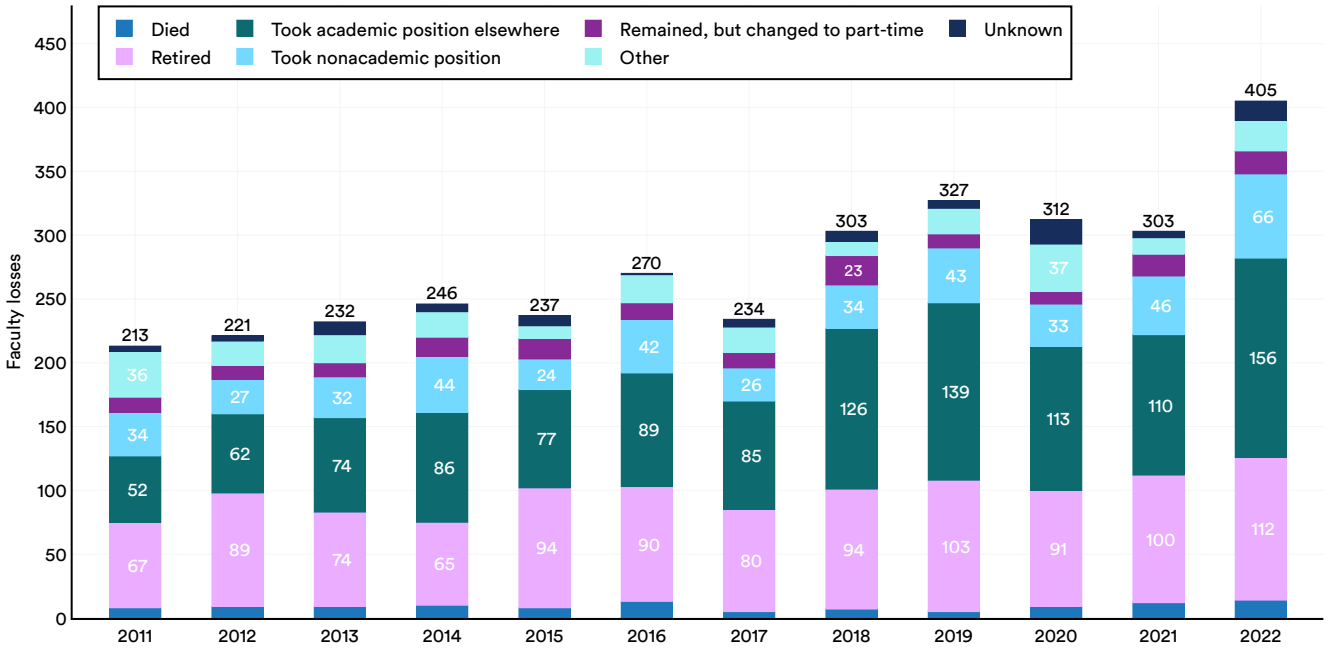


Figure 6.1.14

Since 2015, the increase in median nine-month salaries for full professors has slightly fallen below U.S. inflation rates, whereas median salaries for assistant and associate professors have seen slight increases above inflation. In 2022, a full professor's salary was 3.2% higher than in 2021, which did not keep pace with the 7% U.S. inflation rate, and 16.4% higher than in 2015, still below the 19% inflation increase over those years (Figure 6.1.15).

Median nine-month salary of CS faculty in the United States, 2015–22

Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

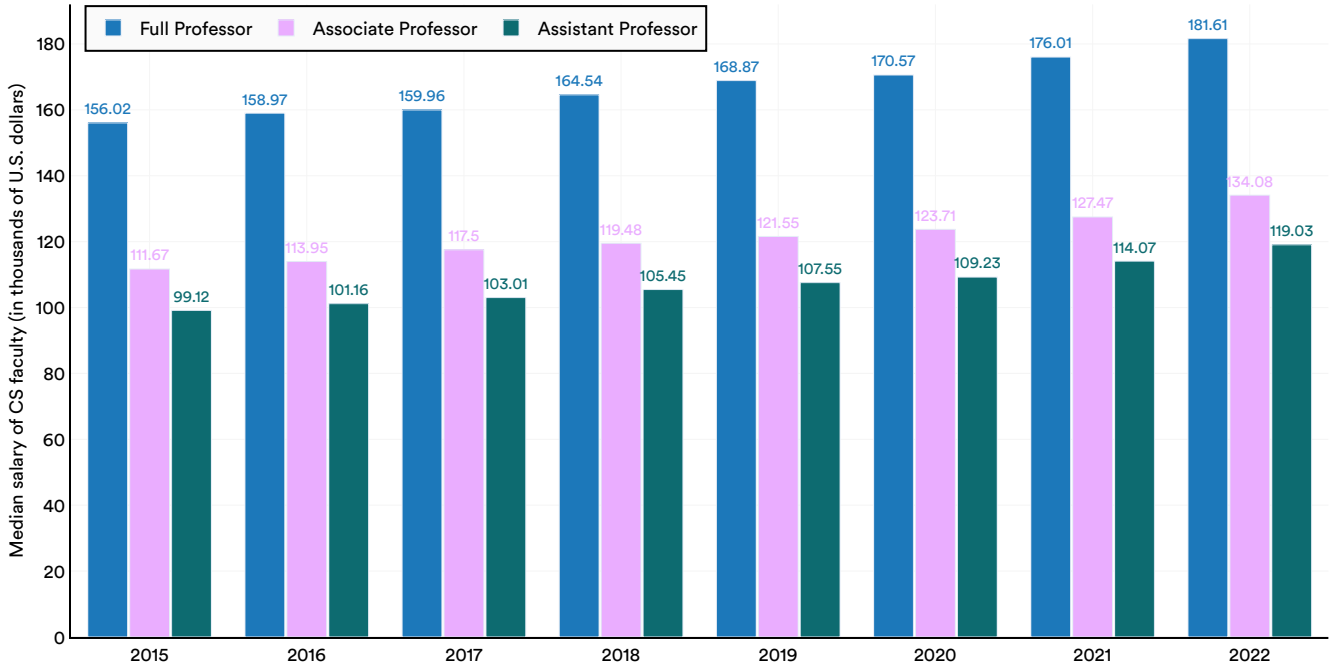


Figure 6.1.15

In 2022, the proportion of international hires among new tenure-track faculty in CS, CE, and information disciplines significantly increased to 19.3% from 13.2% the previous year (Figure 6.1.16). This marked the second-highest percentage recorded in the past decade, only surpassed by 2013.

New international CS, CE, and information tenure-track faculty hires (% of total) in the United States and Canada, 2010–22

Source: CRA Taulbee Survey, 2023 | Chart: 2024 AI Index report

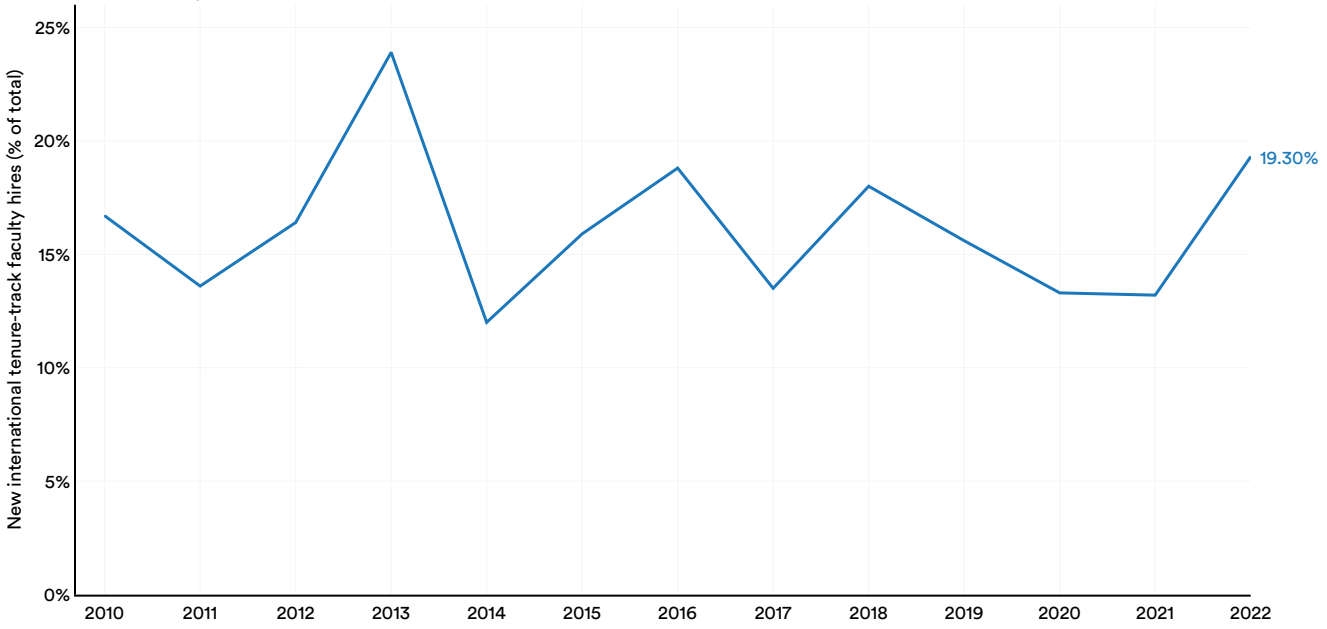


Figure 6.1.16

Europe

Data on European CS graduates comes from Informatics Europe, an academic and research community that, among other goals, monitors the state of informatics education in Europe.[3] Informatics Europe gathers data on graduates in informatics, CS, CE, computing, and information technology (IT) disciplines from statistical offices of European governments.[4]

Informatics, CS, CE, and IT Bachelor's Graduates

In 2022, the United Kingdom led with the highest number of new graduates in informatics, CS, CE, and IT at the bachelor's level, totaling approximately 25,000 (Figure 6.1.17).[5] Germany and Turkey followed closely. Most countries in the sample saw an increase in graduates in these fields compared to a decade ago, though there were exceptions like Poland, Spain, and the Czech Republic (Figure 6.1.18).

New informatics, CS, CE, and IT bachelor's graduates by country in Europe, 2022
Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

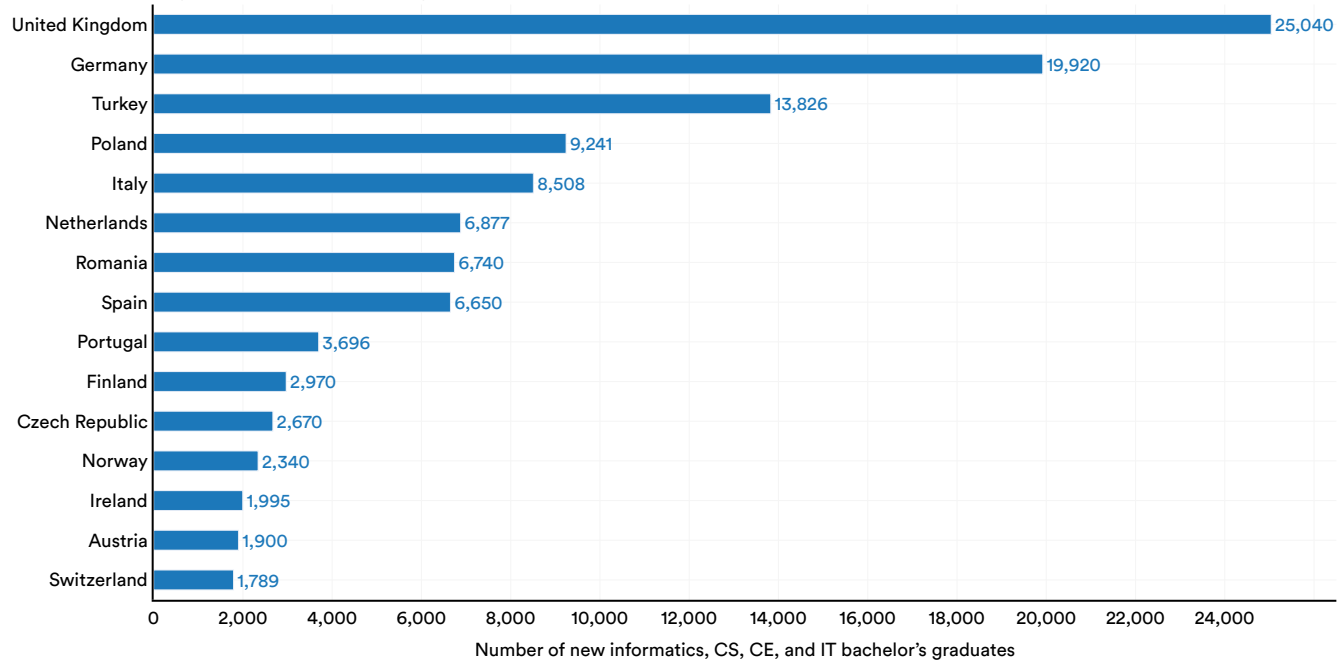


Figure 6.1.17

3 There is no singular term for CS education that is used uniformly across European countries. Across Europe, CS education can be reflected in terms such as informatics, computer science (CS), computer engineering (CE), computing, information technology (IT), information and communication technology (ICT), and information science and technology (IST). The full list of subject names (and English translations) that Informatics Europe uses to identify informatics studies programs can be found at the following link.

4 Readers are cautioned against making per capita comparisons between the CRA North American data and the European CS graduate data detailed in subsequent sections, as the European data is collected from national statistical offices and boasts broader coverage.

5 Note that not all countries for which the AI Index has data are visualized in the figures in this section. To access the complete data, please view the public data associated with this chapter. Moreover, the year label refers to the year in which an academic year ends. For example, the figures visualizing new graduates for 2022 reflect the number of graduates reported for the 2021/2022 academic year. For the sake of visual simplicity, the Index opts to focus on the year in which students graduated.

Percentage change of new informatics, CS, CE, and IT bachelor's graduates by country in Europe, 2012 vs. 2022

Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

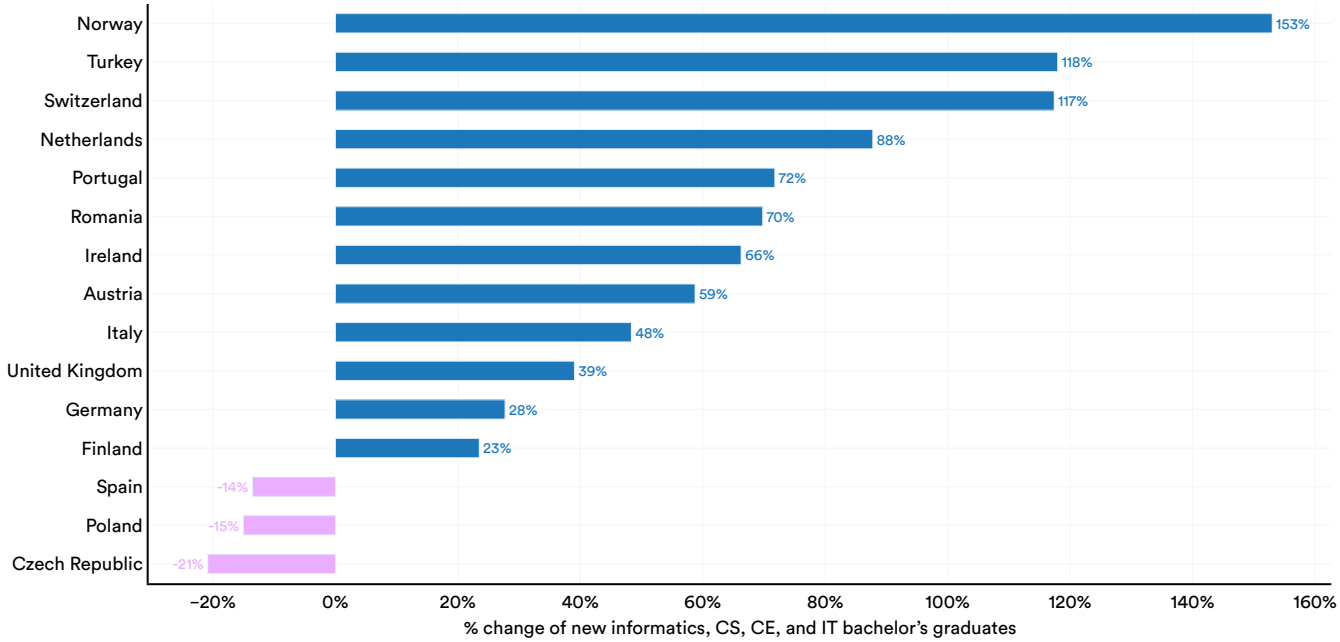


Figure 6.1.18

Finland (53.4), Norway (42.6), and the Netherlands (38.6) lead in the number of new bachelor's graduates in informatics CS, CE, and IT per 100,000 inhabitants (Figure 6.1.19). On a per capita basis, most sampled European countries have seen increases in the total number of informatics, CS, CE, and IT bachelor's graduates (Figure 6.1.20).

New informatics, CS, CE, and IT bachelor's graduates per 100,000 inhabitants by country in Europe, 2022

Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

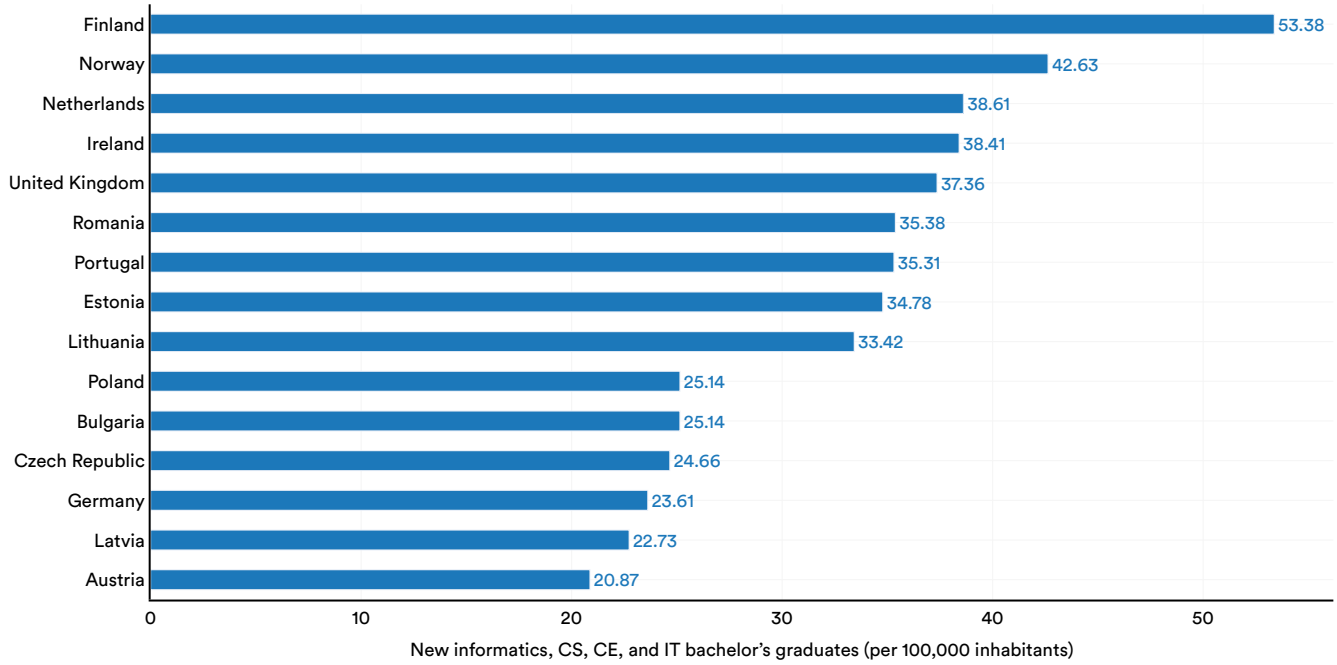


Figure 6.1.19

Percentage change of new CS, CE, and Information bachelor's graduates per 100,000 inhabitants by country in Europe, 2012 vs. 2022

Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

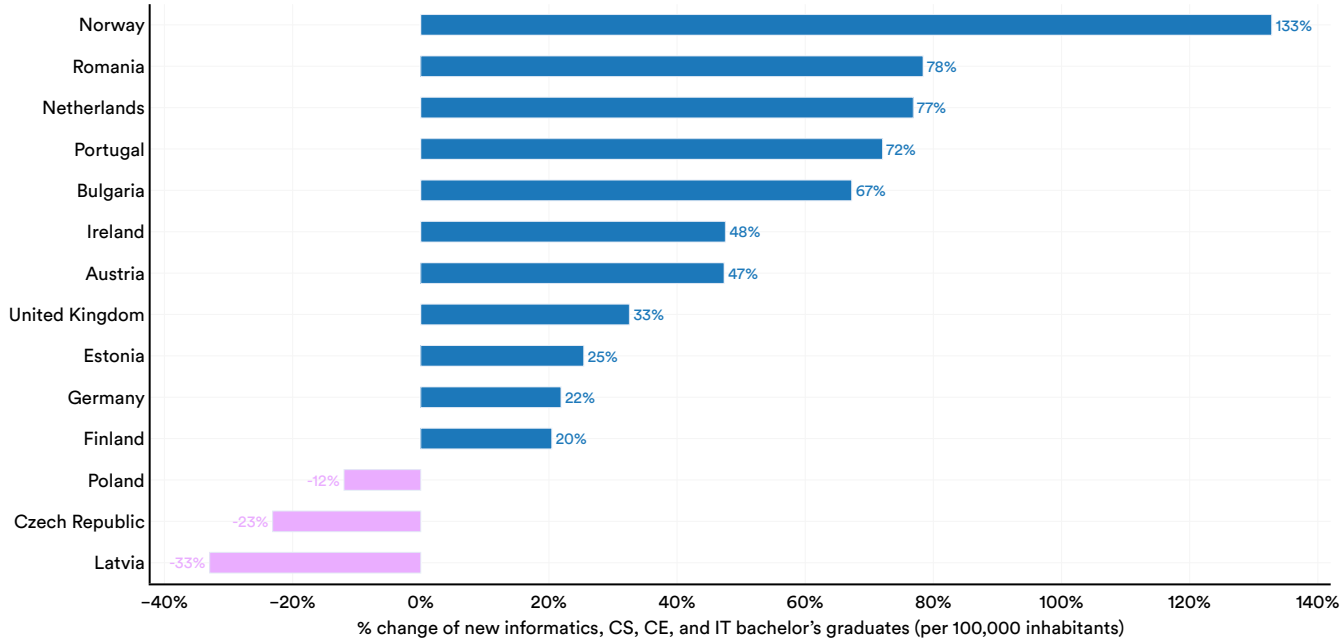


Figure 6.1.20

Informatics, CS, CE, and IT Master's Graduates

Similar to bachelor's graduates, the United Kingdom leads Europe in producing new master's graduates in informatics, CS, CE, and IT, with approximately 20,000 graduates (Figure 6.1.21). In the last decade, Germany (259%), Turkey (197%), and Spain (194%) have seen the greatest percentage growth in new informatics, CS, CE, and IT master's graduates (Figure 6.1.22).

New informatics, CS, CE, and IT master's graduates by country in Europe, 2022

Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

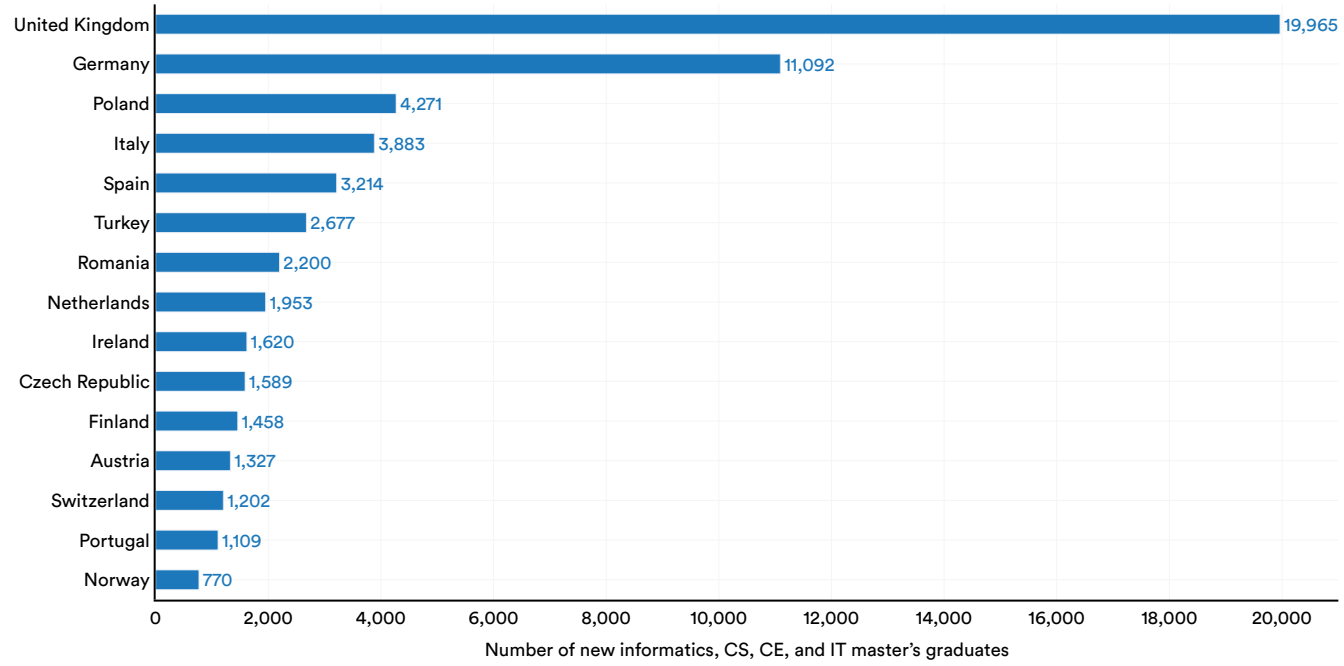


Figure 6.1.21

Percentage change of new informatics, CS, CE, and IT master's graduates by country in Europe, 2012 vs. 2022

Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

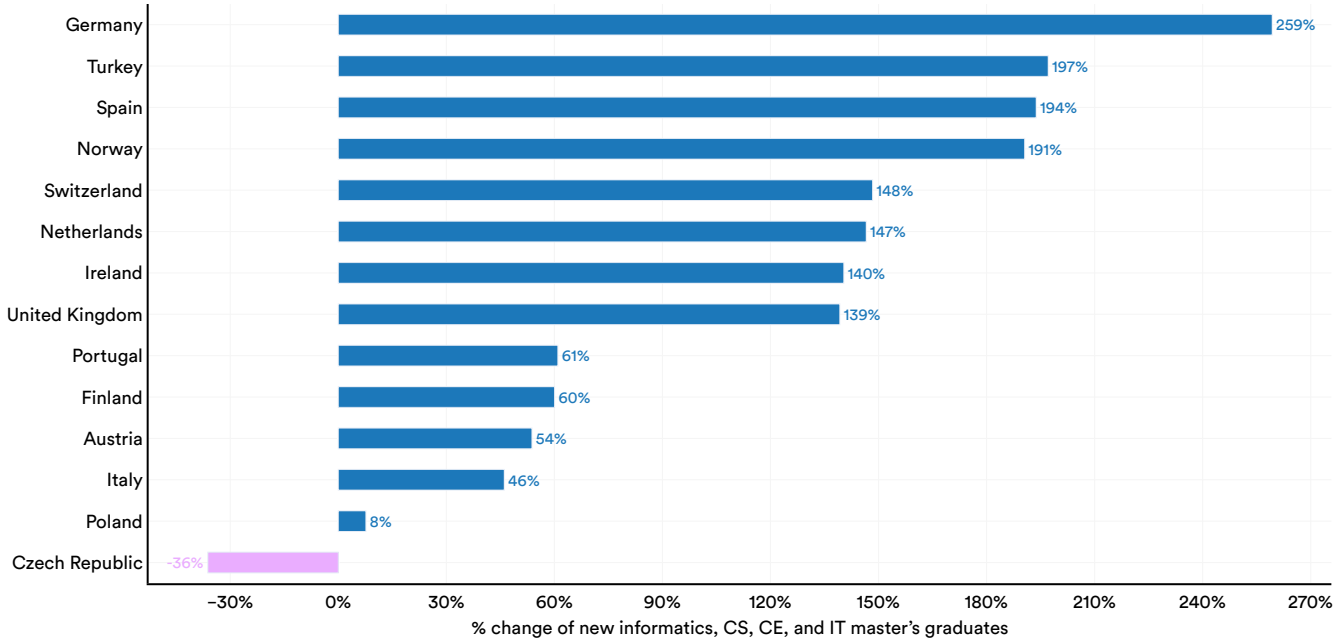


Figure 6.1.22

Per capita metrics paint a somewhat similar picture. Ireland has the most informatics, CS, CE, and IT master's graduates on a per capita basis (31.2), followed by the United Kingdom (29.8) and Estonia (27.4) (Figure 6.1.23). On a per capita basis, Germany (243%) has also seen the greatest growth of informatics, CS, CE, and IT master's graduates in the last decade (Figure 6.1.24).

New informatics, CS, CE, and IT master's graduates per 100,000 inhabitants by country in Europe, 2022
Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

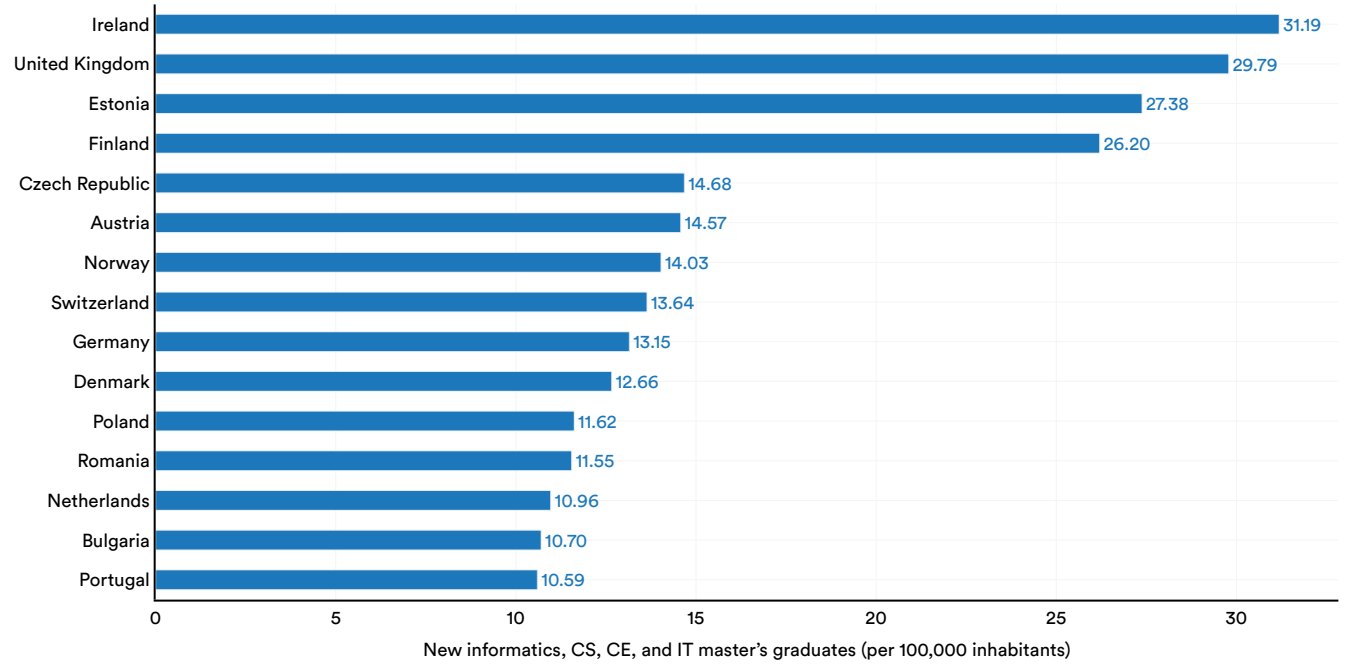


Figure 6.1.23

Percentage change of new informatics, CS, CE, and IT master's graduates per 100,000 inhabitants by country in Europe, 2012 vs. 2022

Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

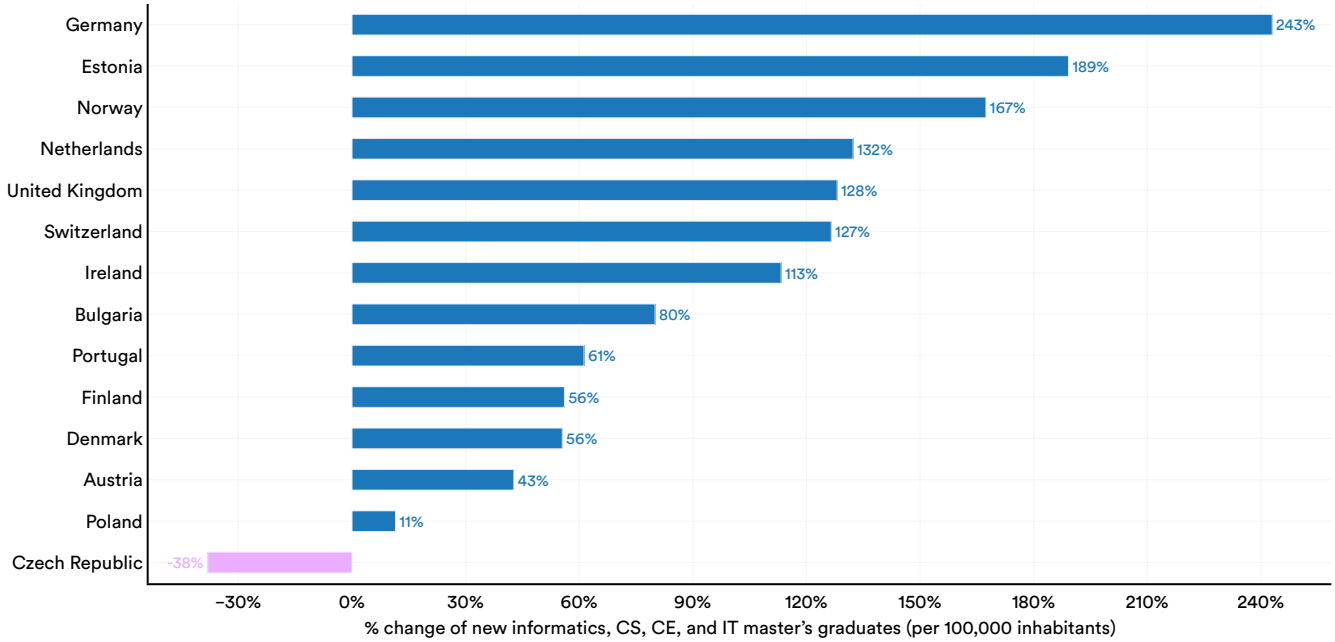


Figure 6.1.24

Informatics, CS, CE, and IT PhD Graduates

The United Kingdom (1,060) and Germany (910) also produced the most informatics, CS, CE, and IT PhD graduates in 2022, followed by Italy (581) (Figure 6.1.25). In the last decade, Turkey has seen the greatest growth in new CS, CE, and information PhD graduates (Figure 6.1.26).

New informatics, CS, CE, and IT PhD graduates by country in Europe, 2022
Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

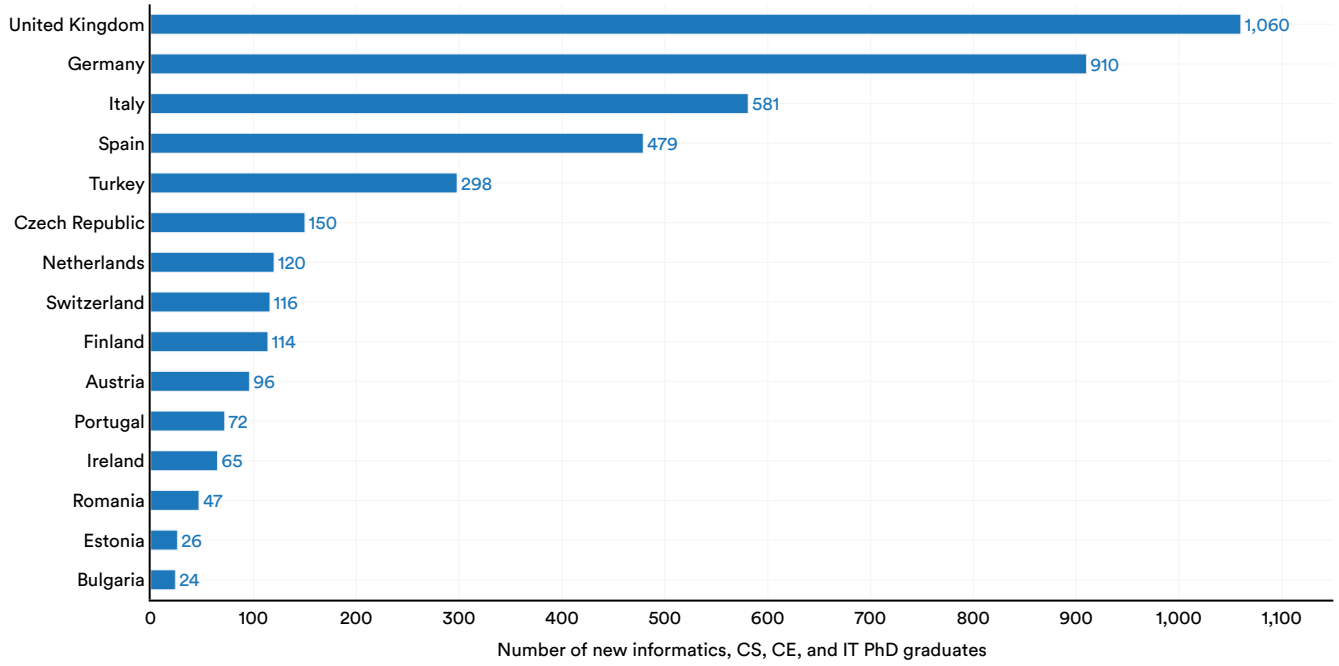


Figure 6.1.25

Percentage change of new informatics, CS, CE, and IT PhD graduates by country in Europe, 2012 vs. 2022

Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

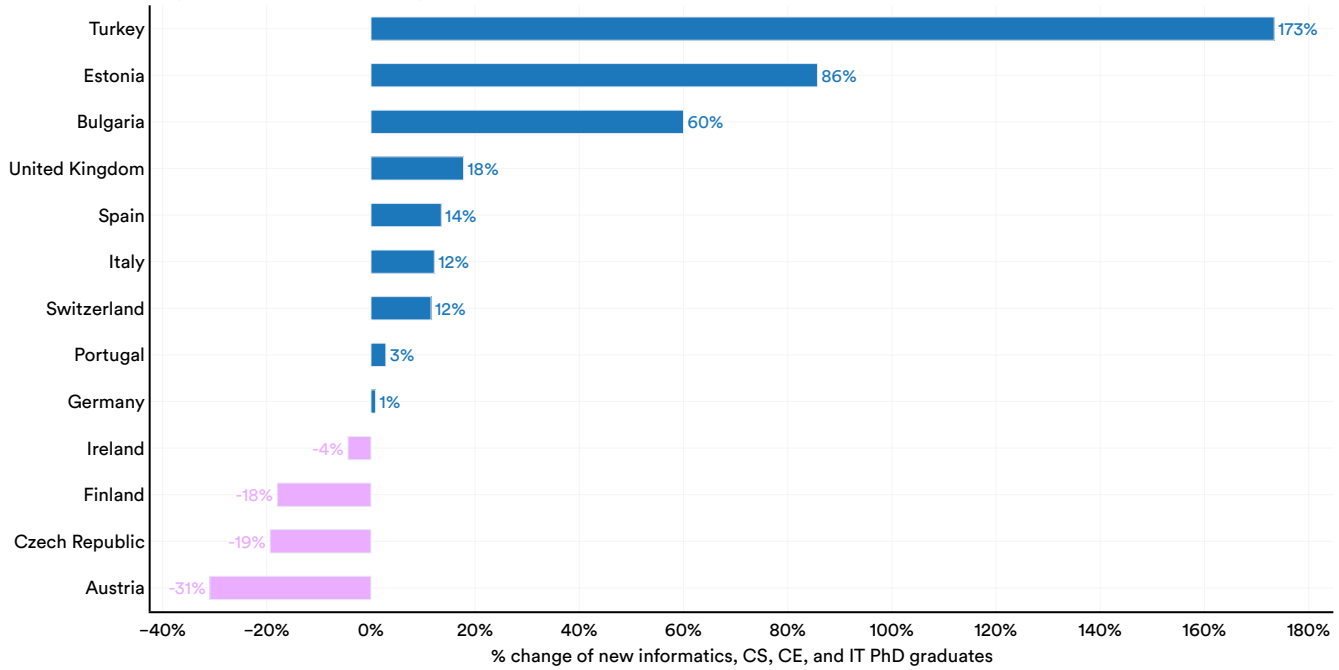


Figure 6.1.26

Finland has the greatest number of new informatics, CS, CE, and IT PhD graduates per capita. For every 100,000 inhabitants, it has 2.1 informatics, CS, CE, and IT PhD graduates (Figure 6.1.27). Estonia slightly trails (1.9), as does the United Kingdom (1.6). On a per capita basis, the growth rate of new informatics, CS, CE, and IT PhDs has been relatively marginal in several major European countries such as the United Kingdom, Portugal, and Switzerland (Figure 6.1.28).

New informatics, CS, CE, and IT PhD graduates per 100,000 inhabitants by country in Europe, 2022
Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

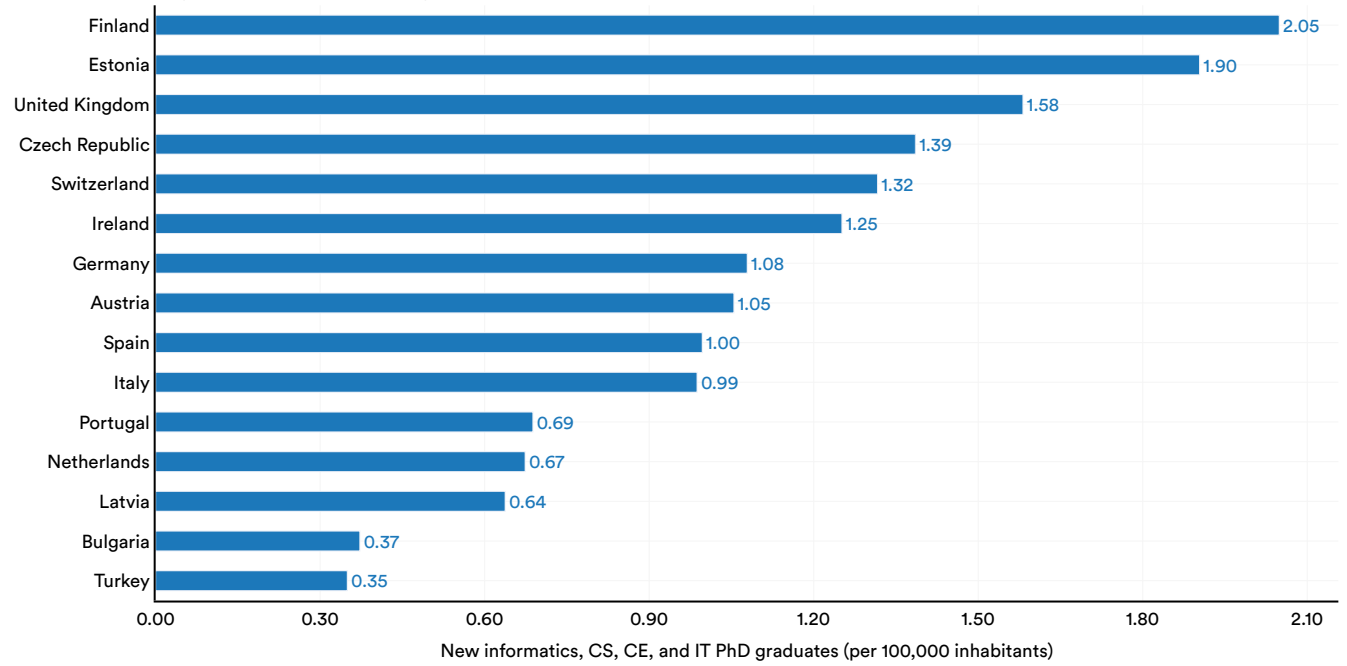


Figure 6.1.27

Percentage change of new informatics, CS, CE, and IT PhD graduates per 100,000 inhabitants by country in Europe, 2012 vs. 2022

Source: Informatics Europe, 2023 | Chart: 2024 AI Index report

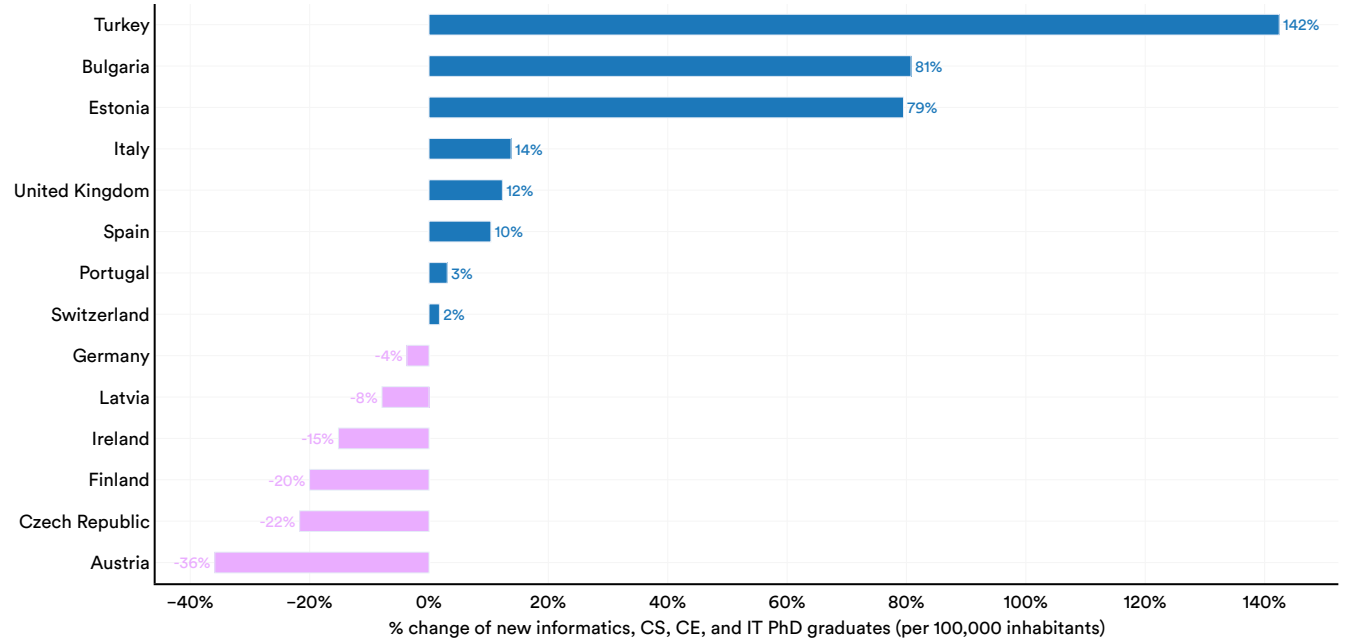


Figure 6.1.28

AI-Related Study Programs

Tracking the number of AI-related courses provides insight into the educational interest in AI. This section highlights data from Studyportals, an international platform monitoring English-language university study programs worldwide. Their portal encompasses information on over 200,000 courses at more than 3,750 educational institutions across 110 countries.[6]

Total Courses

A study program, or degree program, comprises a series of courses designed to enable students to earn a relevant qualification, such as a degree or diploma. The number of English-language AI-related study programs has tripled since 2017, demonstrating a consistent yearly increase over the last five years (Figure 6.1.29). This trend indicates a steadily growing educational interest in AI.

Number of AI university study programs in English in the world, 2017–23

Source: Studyportals, 2023 | Chart: 2024 AI Index report

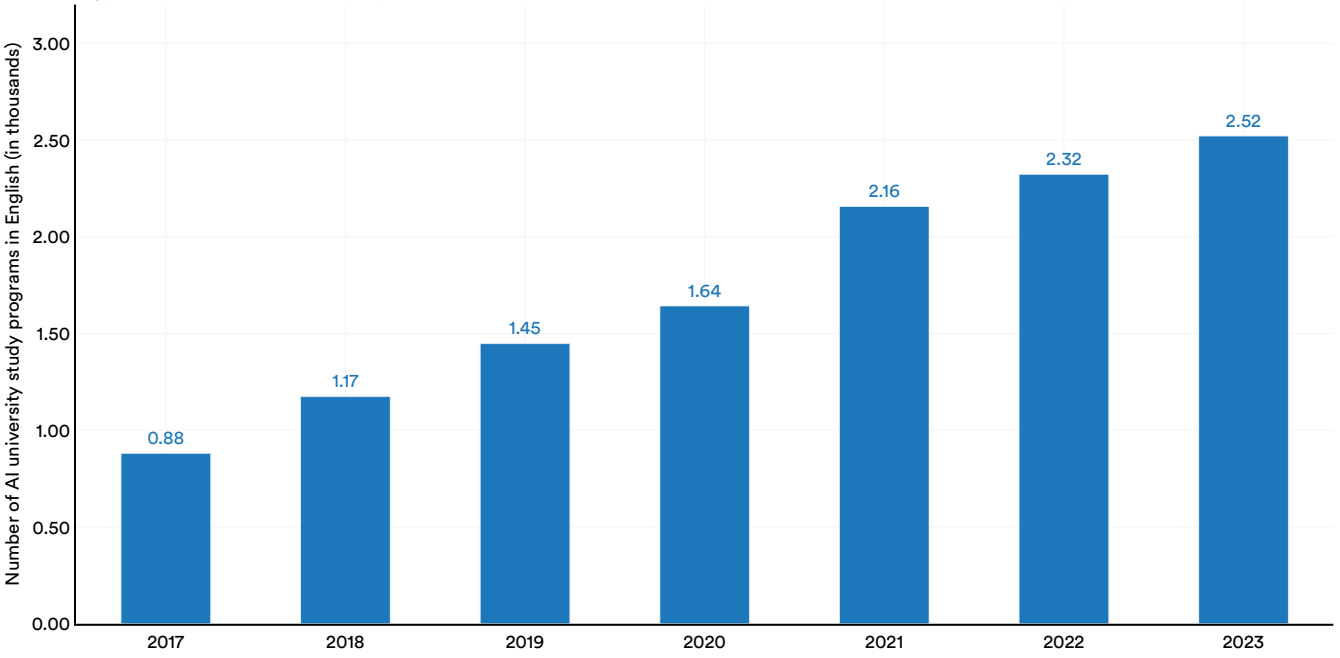


Figure 6.1.29

6 Currently, Studyportals, the company supplying data on AI university study programs, tracks only English-language AI courses. In the coming years, the Index plans to extend its coverage to include non-English programs.

Education Level

Broken down by educational level, the majority of AI study programs are offered at the master's level (55.0%), followed by the bachelor's level (39.8%), and finally at the PhD level (5.3%) (Figure 6.1.30).

AI university study programs in English (% of total) by education level, 2023

Source: Studyportals, 2023 | Chart: 2024 AI Index report

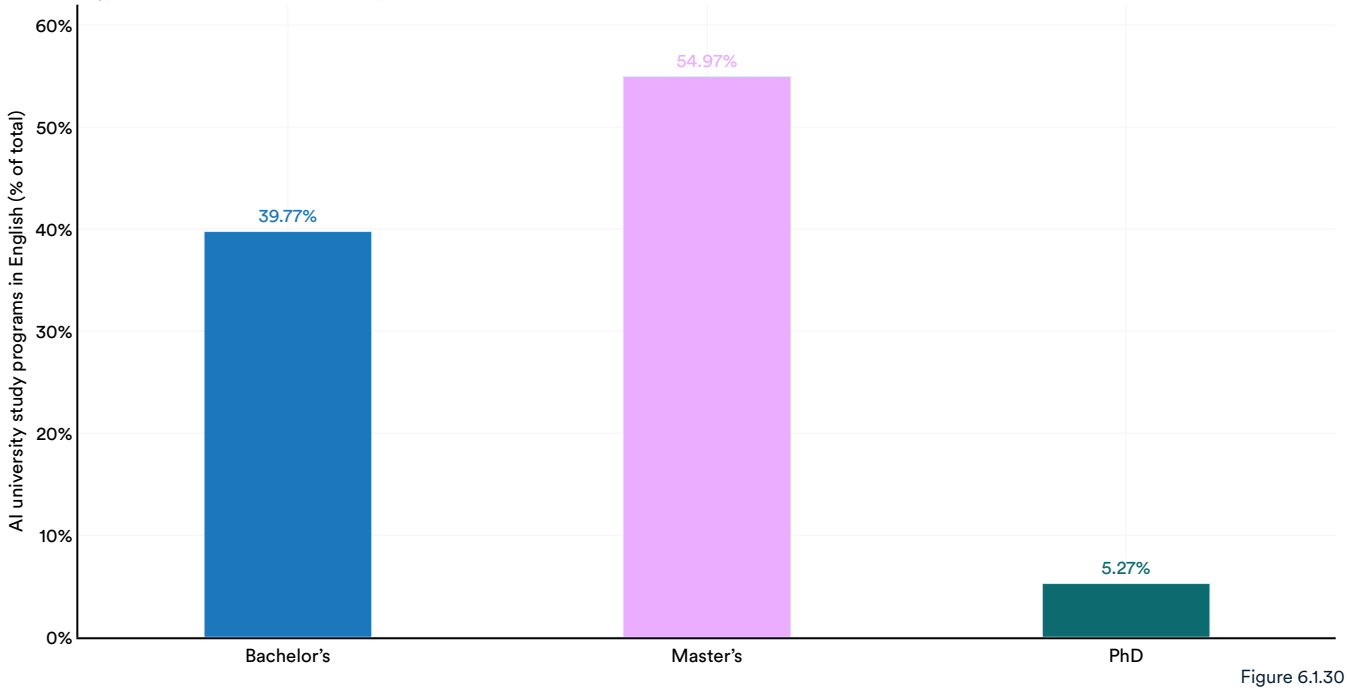


Figure 6.1.30

Geographic Distribution

In 2023, the United Kingdom had the greatest number of English-language AI study programs (744) (Figure 6.1.31). Next was the United States (667) and Canada (89). For virtually every country included in the sample, there was a greater number of AI university study programs in 2023 than in 2022. Malta, the United Kingdom, and Cyprus had the greatest number of English-language AI university study programs per capita in 2023 (Figure 6.1.32).[7]

Number of AI university study programs in English by geographic area, 2022 vs. 2023

Source: Studyportals, 2023 | Chart: 2024 AI Index report

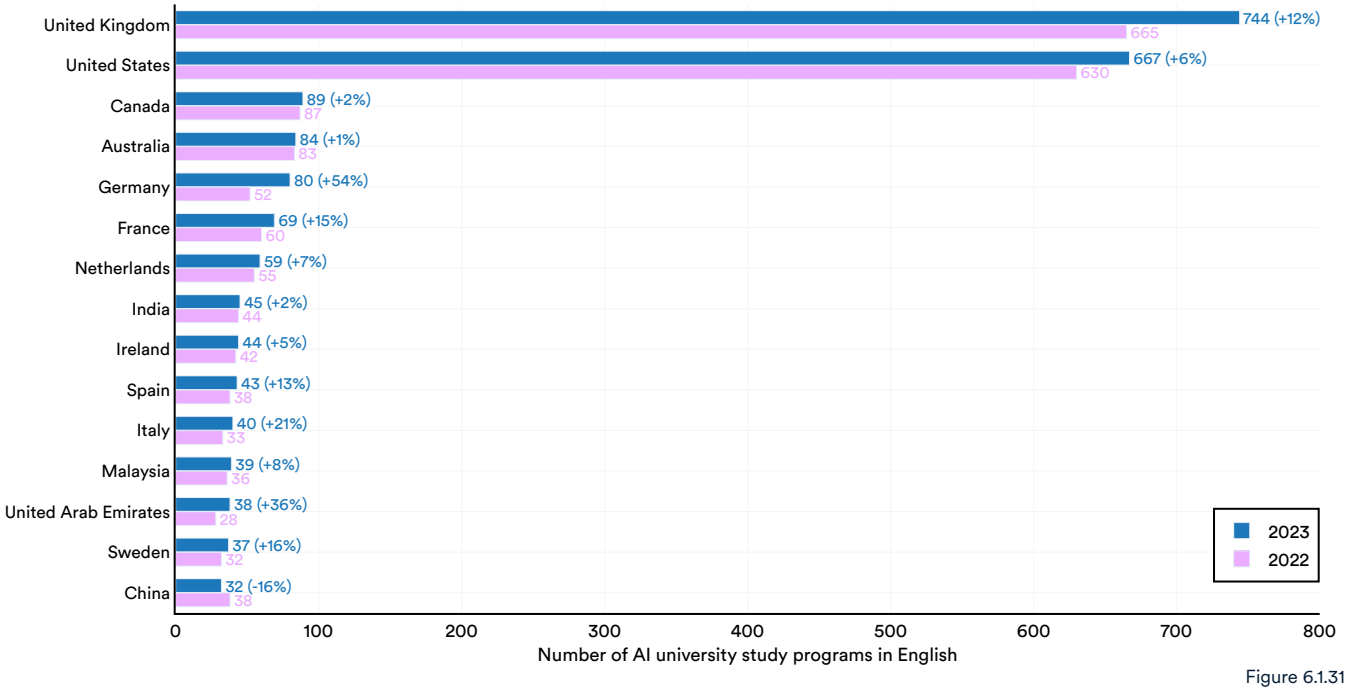


Figure 6.1.31

7 Although the United Kingdom has fewer universities overall compared to the United States, it likely reports a higher number of AI study programs for several reasons. Firstly, Studyportals has slightly greater coverage of the United Kingdom than the United States in its data. Secondly, the structure of higher education in the United States tends to be more generalist compared to the United Kingdom, meaning students studying AI might be enrolled in broader computer science programs that are not explicitly identified as AI study programs.

AI university study programs in English per 100,000 inhabitants by geographic area, 2022 vs. 2023

Source: Studyportals, 2023 | Chart: 2024 AI Index report

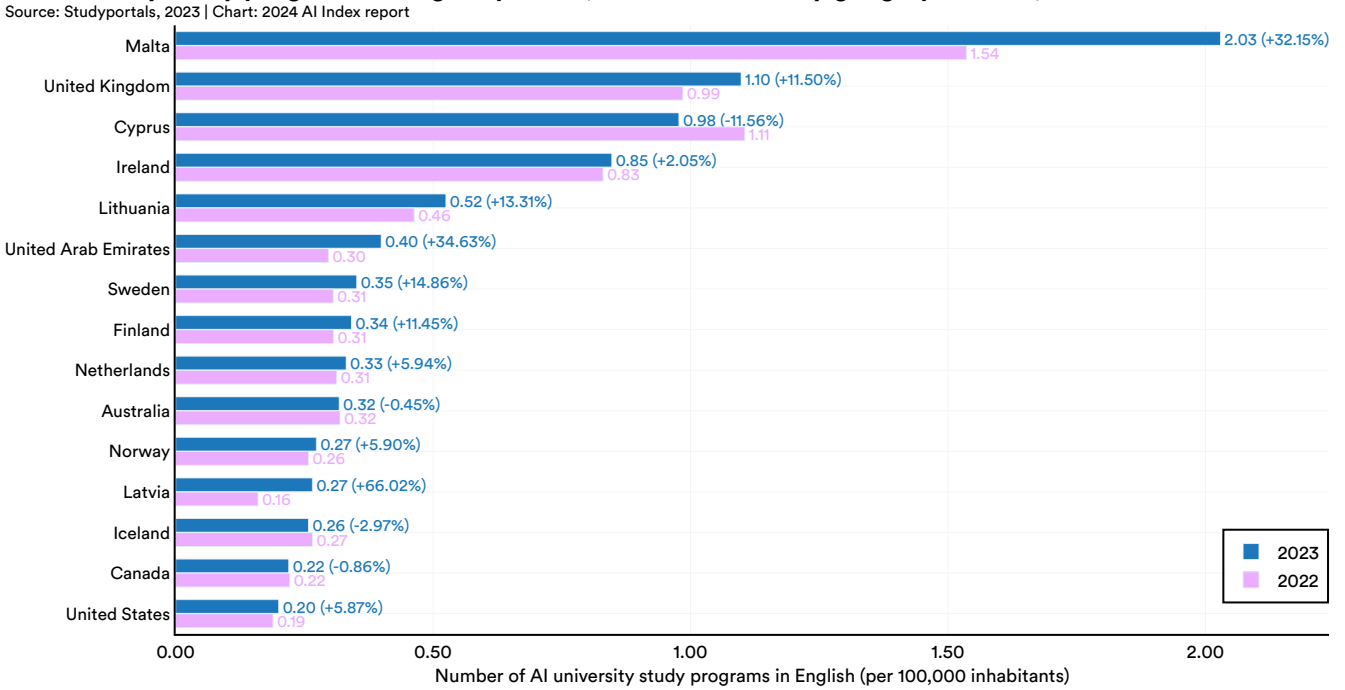


Figure 6.1.32

This section presents trends in high school CS education in the United States as a representation of K–12 AI education.

6.2 K–12 CS and AI Education

United States

Data on the state of K–12 CS education in the United States comes from Code.org, an education innovation nonprofit dedicated to ensuring that every school includes CS as part of its core K–12 education.

State-Level Trends

In 2023, 30 American states required that all high schools offer a foundational course in CS (Figure 6.2.1).

The percentage of public schools offering CS courses varies significantly from state to state (Figure 6.2.2). The top three states in terms of percentage of CS offerings are Maryland (99%), Arkansas (99%), and Nevada (96%); the bottom three are Minnesota (28%), Montana (34%), and Louisiana (35%).

States requiring that all high schools offer a foundational CS course, 2023
Source: Code.org, 2023 | Chart: 2024 AI Index report

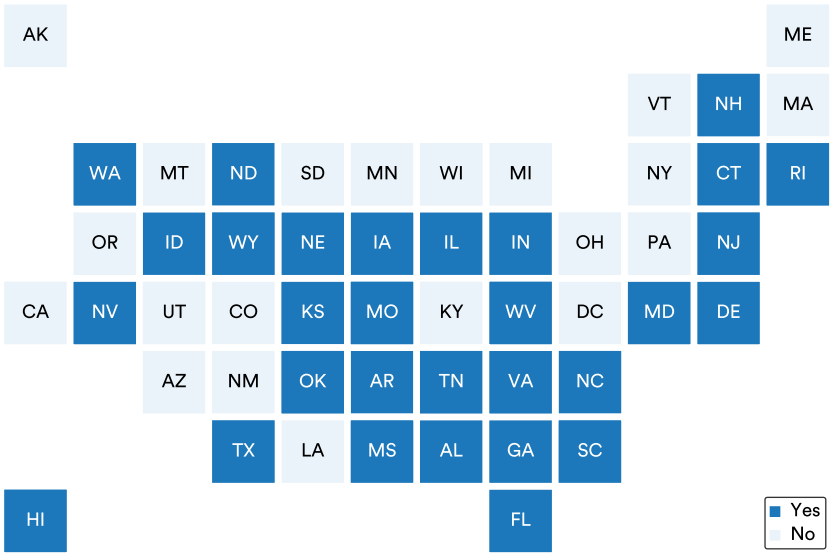


Figure 6.2.1

Public high schools teaching foundational CS (% of total in state), 2023
Source: Code.org, 2023 | Chart: 2024 AI Index report

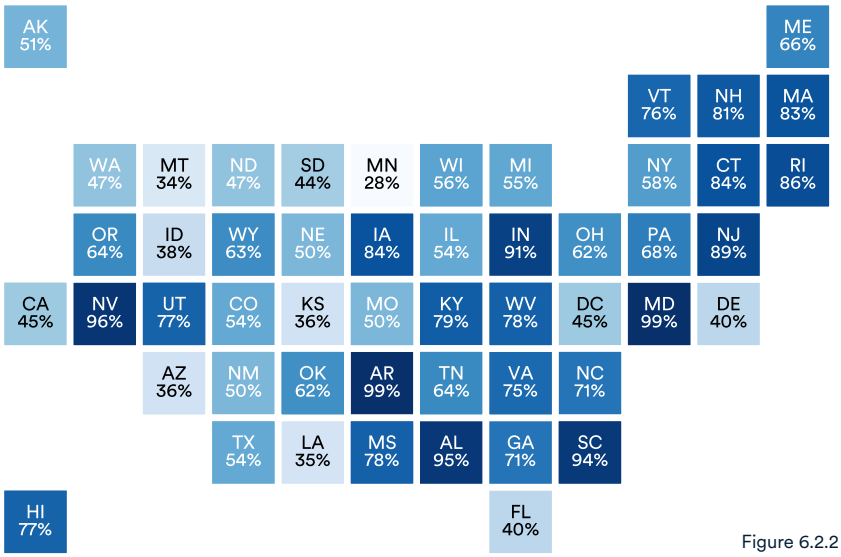


Figure 6.2.2

K–12 CS education is expanding in the United States (Figure 6.2.3). In 2017, only a few states supported high school CS programs. Now, approximately two-thirds of states require that CS be taught in high schools, allocate funding for it, and have developed state plans for CS education.

Changes over time in state-level US K–12 CS education
Source: Code.org, 2023 | Chart: 2024 AI Index report

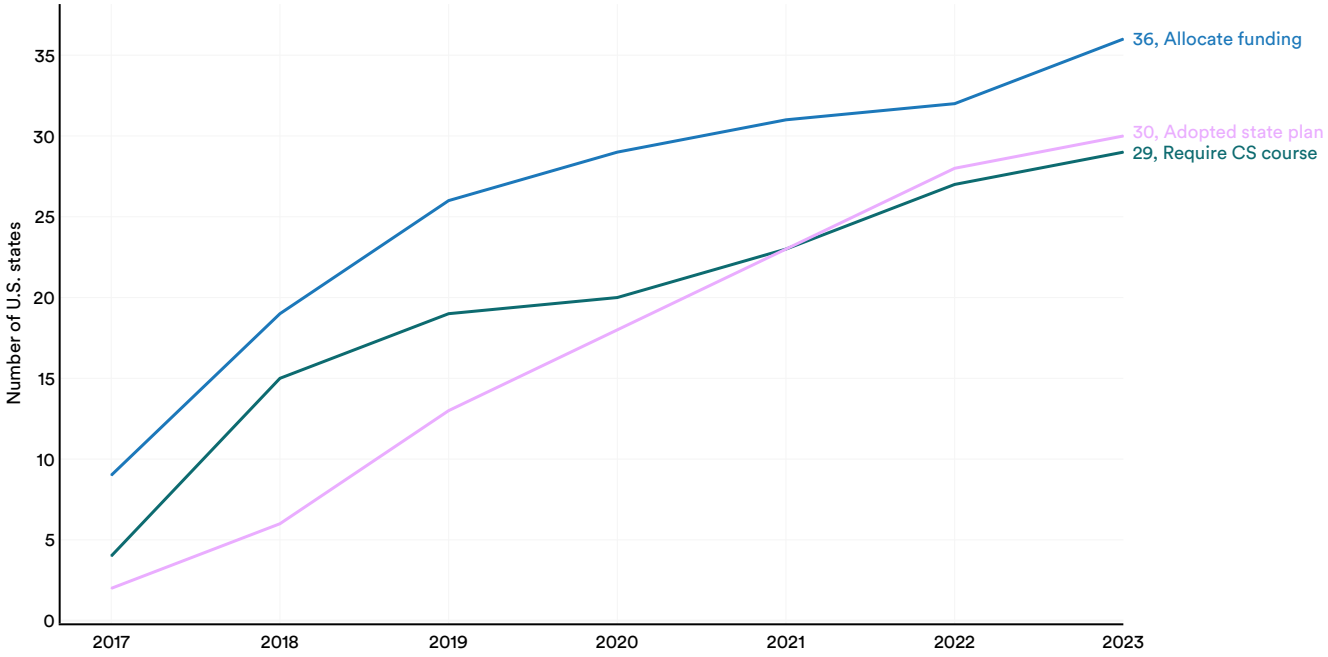


Figure 6.2.3

AP Computer Science

The state of K–12 CS education in the United States can also be observed by analyzing trends in the total number of AP CS exams.[8] In 2022, approximately 201,000 exams were administered, marking an 11.1% increase from 2021 (Figure 6.2.4). Since 2007, the number of AP CS exams administered has increased more than tenfold.

Number of AP computer science exams taken, 2007–22

Source: Code.org, 2023 | Chart: 2024 AI Index report

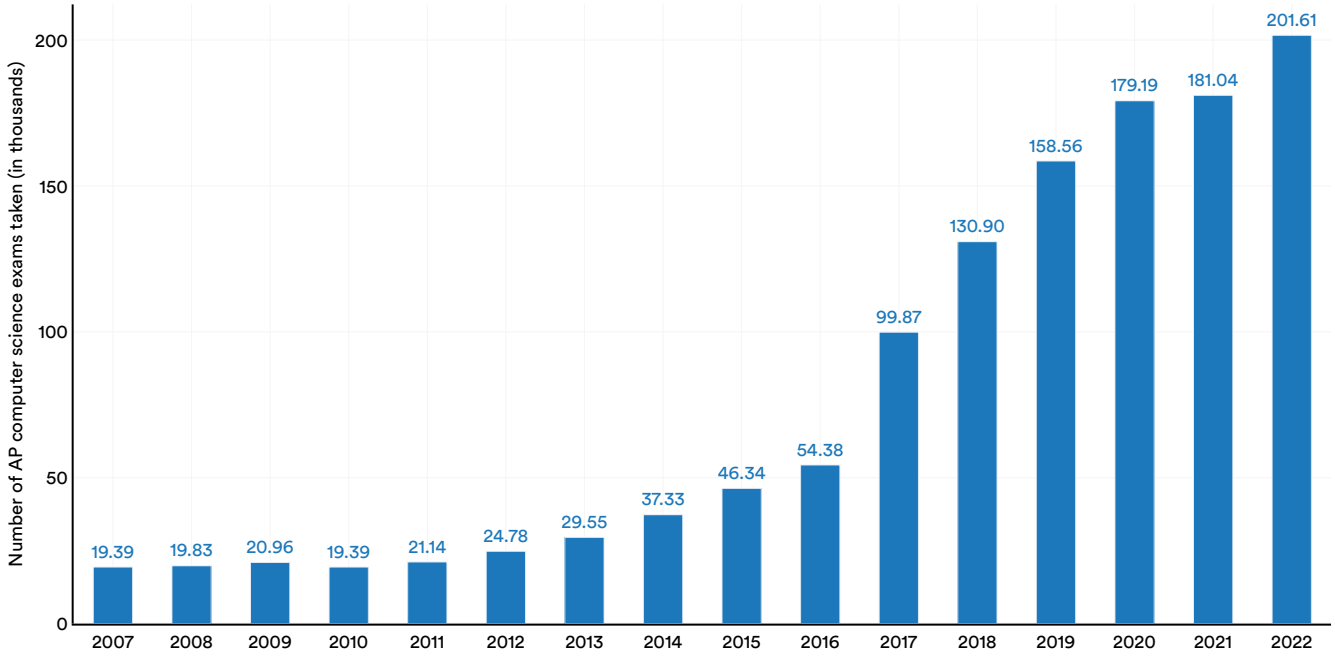


Figure 6.2.4

8 There are two types of AP CS exams: Computer Science A and Computer Science Principles. Data on computer science exams taken includes both exams. AP CS Principles was initially offered in 2017.

In 2022, California (33,262), Texas (20,901), and Florida (16,248) were the leading states in terms of the number of AP CS exams taken (Figure 6.2.5). On the other end, Montana (39), South Dakota (40), and North Dakota (100) are the states where the fewest exams were taken.

Per capita, Maryland (126.5), New Jersey (112.7), and Massachusetts (92.7) ranked highest in the number of AP CS exams taken (Figure 6.2.6).

Number of AP computer science exams taken, 2022
Source: Code.org, 2023 | Chart: 2024 AI Index report

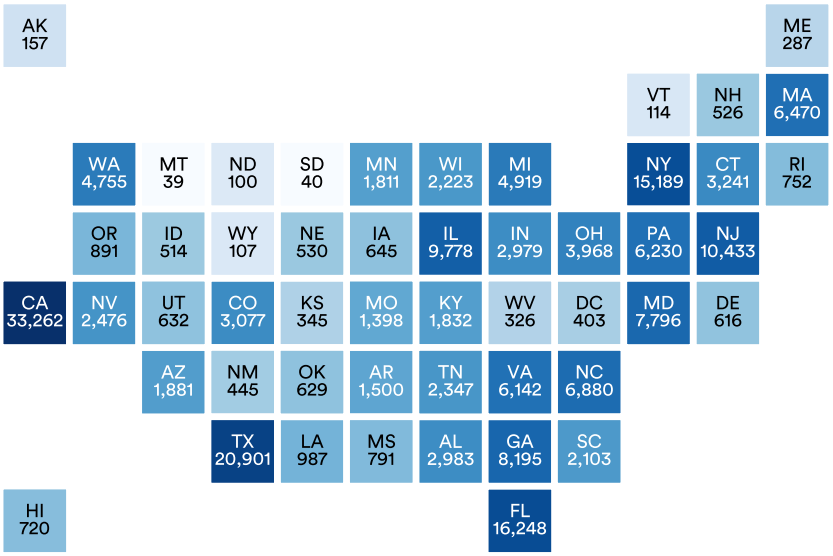


Figure 6.2.5

Number of AP computer science exams taken per 100,000 inhabitants, 2022
Source: Code.org, 2023 | Chart: 2024 AI Index report

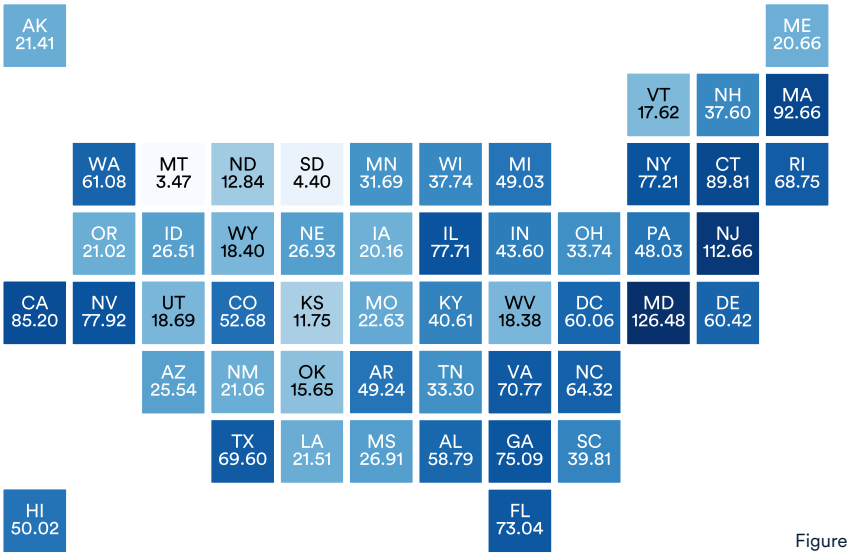


Figure 6.2.6

Highlight:

Access Issues

Code.org data suggests that factors such as school size and location significantly influence CS education accessibility. Large schools (over 1,200 students) are 15 percentage points more likely to offer CS courses than medium-sized schools (500–1,200 students), with the gap widening further when compared to small schools (under 500 students) (Figure 6.2.7). Similarly, students in suburban districts have better access to CS courses than their counterparts in both urban and rural areas (Figure 6.2.8).

Schools offering foundational CS courses by size, 2023

Source: Code.org, 2023 | Chart: 2024 AI Index report

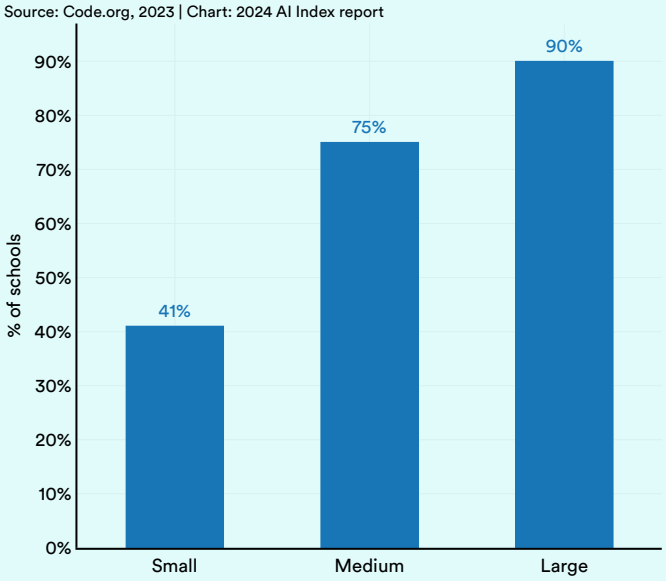


Figure 6.2.7

Schools offering foundational CS courses by geographic area, 2023

Source: Code.org, 2023 | Chart: 2024 AI Index report

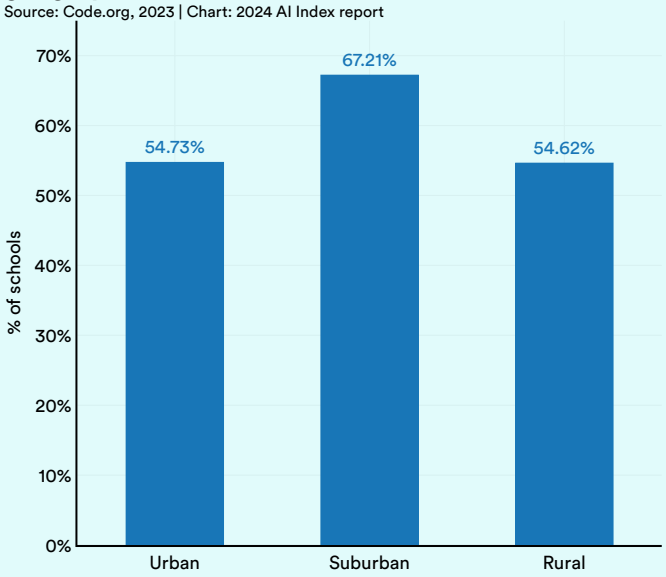


Figure 6.2.8

Highlight:

ChatGPT Usage Among Teachers and Students

The introduction of generative AI tools, including ChatGPT, has sparked significant debate regarding their potential applications in education. Some individuals have raised concerns that these tools could be misused for plagiarism, potentially prompting a reevaluation of the ways in which American students may be taught.

This year, Impact Research, funded by the Walton Family Foundation, carried out a series of surveys on American teachers' and educators' perceptions and use of ChatGPT.[9] The surveys revealed that a majority of K–12 teachers in the United States are already utilizing ChatGPT, with usage increasing over the year: In March 2023, 51% of teachers reported having used ChatGPT at least once, and by July 2023, that figure had risen to 63% (Figure 6.2.9). Among the teachers who reported using ChatGPT, 30% employed it for lesson planning, another 30% for generating new creative class ideas, and 27% for enhancing their background knowledge (Figure 6.2.10).

ChatGPT usage rate among American K–12 teachers, 2023

Source: Impact Research, 2023 | Chart: 2024 AI Index report

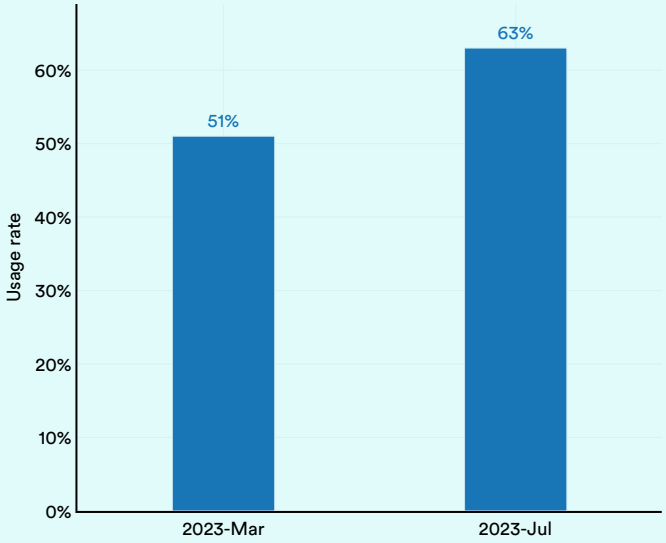


Figure 6.2.9

ChatGPT usage purposes among American K–12 teachers, 2023

Source: Impact Research, 2023 | Chart: 2024 AI Index report

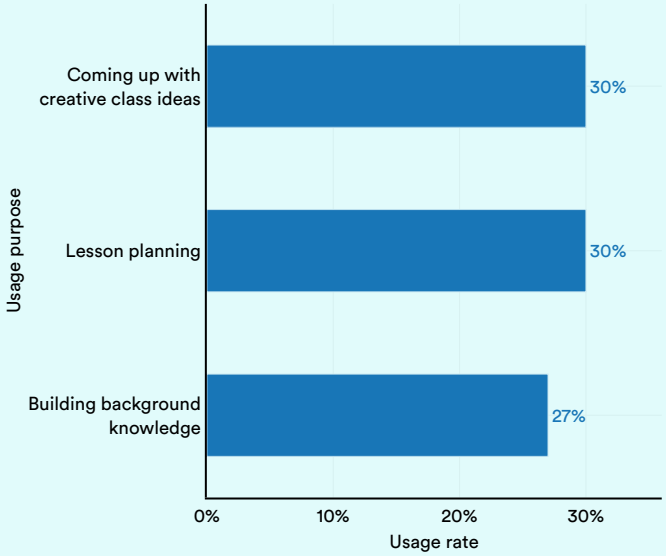


Figure 6.2.10

9 To learn more about the surveys, including their methodologies, please visit the following links: March 2023 and July 2023.

Highlight:

ChatGPT Usage Among Teachers and Students (cont'd)

Both teachers and students have overwhelmingly positive attitudes toward ChatGPT. According to the March 2023 survey, 88% of the teachers believe that ChatGPT has a positive impact, a sentiment echoed by 79% of the students surveyed (Figure 6.2.11). Furthermore, 76% of teachers and 65% of students feel that ChatGPT is important to incorporate into the educational process. This recent data indicates that tools like ChatGPT are poised to become a staple in the American educational landscape in the foreseeable future.

ChatGPT perceptions among educational users, 2023

Source: Impact Research, 2023 | Chart: 2024 AI Index report

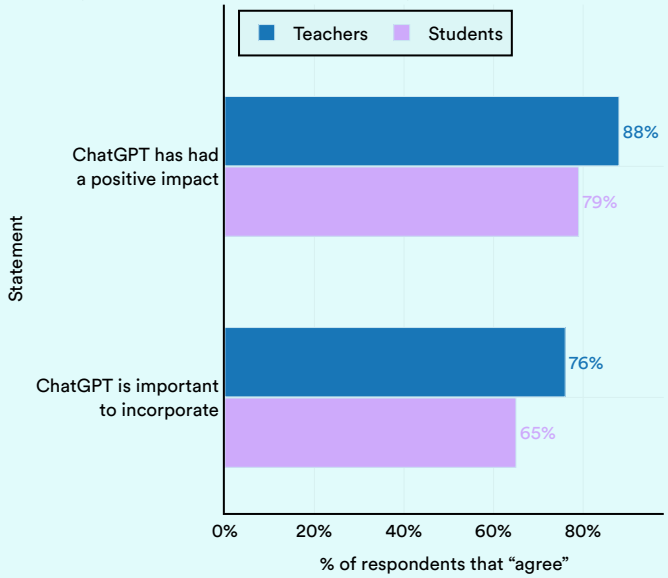


Figure 6.2.11

Appendix

Code.org

State-Level Data

The following link includes a full description of the methodology used by Code.org to collect its 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's State of Computer Science Education 2023 report.

Computing Research Association (CRA Taulbee Survey)

Note: This year's AI Index reused the methodological notes that were submitted by the CRA for previous editions of the AI Index. For more complete delineations of the methodology used by the CRA, please consult the individual CRA surveys that are linked below.

Computing Research Association (CRA) members are 200-plus North American organizations active in computing research: academic departments of computer science and computer engineering; laboratories and centers in industry, government, and academia; and affiliated professional societies (AAAI, ACM, CACS/AIC, IEEE Computer Society, SIAM USENIX). CRA's mission is to enhance innovation by joining with industry, government, and academia to strengthen research and advance education in computing. Learn more about CRA here.

The CRA Taulbee Survey gathers survey data during the fall of each academic year by reaching out to over 200 PhD-granting departments. Details about the Taulbee Survey can be found here. Taulbee doesn't directly survey the students. The department identifies each new PhD's area of specialization as well as their type of employment. Data is collected from September to January of each academic year for PhDs awarded in the previous academic year. Results are published in May after data collection closes.

The CRA Taulbee Survey is sent only to doctoral departments of computer science, computer engineering, and information science/systems. Historically, (a) Taulbee covers one-quarter to one-third of total BS CS recipients in the United States; (b) the percentage of women earning bachelor's degrees is lower in the Taulbee schools than overall; and (c) Taulbee tracks the trends in overall CS production.

The AI Index used data from the following iterations of the CRA survey:

CRA, 2022
CRA, 2021
CRA, 2020
CRA, 2019
CRA, 2018
CRA, 2017
CRA, 2016
CRA, 2015
CRA, 2014
CRA, 2013
CRA, 2012
CRA, 2011

Impact Research

Data on the usage of ChatGPT in schools among teachers and students came from two Impact Research surveys released in 2023. To learn more about the methodology employed for the surveys, please visit the following links: March 2023 and July 2023.

Informatics Europe

The statistics are annually collected by Informatics Europe and published on the Informatics Europe Higher Education Data Portal, which is updated with the most recent data at the end of the year (typically in December). In the interest of reliability, Informatics Europe collects the data from countries where a solid and reasonably complete picture could be drawn from official sources such as national statistical offices, educational agencies, or ministries. The full list of sources can be found in the Data Portal section "Data Sources." The Data Portal follows the definitions and concepts provided by these national agencies and reflects the national situation in the countries considered. Those aspects that are not exposed by the consulted agencies are not part of the dataset. A full list of definitions and concepts used can be found in the footnotes shown at the bottom of the Statistics section.

Since each national data repository has its own structure and quite often provides all supporting information in the national language, Informatics Europe consults with its members—academics, active and knowledgeable in the informatics field from respective countries—who help to interpret the statistics available and who understand the specificities of these countries' higher education systems. One of the main challenges in integrating the statistical data is the identification of terms used to define the informatics discipline in different countries. Informatics is known under different names in different European languages and countries, and in English as well. A good dozen terms (presented in the Data Portal section "Subjects") are used to denote what is fundamentally the same discipline, and the role of national experts here is to help with screening the terms and programs and identifying which part of them is pertinent to the informatics field.

The data covers the degrees delivered by both traditional Research Universities (RU) and University of Applied Science (UAS) for the countries where these institutions also offer bachelor's and master's studies in informatics. The full list of institutions covered can be found in the Data Portal section "Institutions & Academic Units."

Studyportals

Studyportals is the world's most comprehensive study choice platform. It lists over 200,000 English-taught programs from more than 3,500 institutions, helping over 50 million students per year. The Studyportals analytics and consulting team uses the resulting data to provide higher education organizations with real-time market insights.

Studyportals categorizes the study programs on its portals into disciplines and subdisciplines. The 15 disciplines are broad categories of educational fields to help navigate the portals. The 284 subdisciplines are narrower topics, subdivisions, or specialized areas of disciplines. Paying clients can provide input, but ultimately, data processors manually choose the one-to-three closest fitting subdisciplines according to the following scenarios, listed in decreasing order of likelihood.

1. **Classic scenario**: When the study name closely matches one subdiscipline name.
    a. *"Chemistry" -> subdiscipline Chemistry.*
2. **Classic interdisciplinary scenario**: When the study name closely matches two or three subdiscipline names.
    a. *"International Fashion Management and Marketing" -> subdisciplines Fashion Management + Marketing.*
3. **Specializations scenario**: When not all the subdisciplines are mentioned in the study name, but they are listed as specific specializations, concentrations, or tracks.
    a. *"Business Administration with specializations in Finance and International Business" -> subdisciplines Business Administration + Finance + International Business*
4. **Mixed scenario**: When the study name does not closely match any specific subdiscipline but can be represented by combining two or three subdisciplines.
    a. *"Financial Economics" -> subdisciplines Finance + Economics*
5. **Last resort scenario**: When the study name does not closely match any specific subdiscipline and/or combination, it is instead approximated as closely as possible.
    a. *"UK, EU, and US Copyright Law" -> subdisciplines Patent & Intellectual Property Law + International Law + European Law*

Scenario	Example study name	Example assigned subdisciplines
Study name closely matches one subdiscipline name.	BSc Chemistry	Chemistry
Study name closely matches two or three subdiscipline names.	BA International Fashion Management and Marketing	Fashion Management + Marketing
Not all the subdisciplines are mentioned in the study name, but they are listed as specific specializations, concentrations, or tracks.	MBA Business Administration with specializations in Finance and International Business	Business Administration + Finance + International Business
Study name does not closely match any specific subdiscipline but can be represented by combining two or three subdisciplines.	MSc Financial Economics	Finance + Economics
Study name does not closely match any specific subdiscipline and/or combination and is instead approximated as closely as possible.	LLM UK, EU, and US Copyright Law	Patent and Intellectual Property Law + International Law + European Law