Future-ready
education

EMPOWERING SECONDARY SCHOOL STUDENTS WITH DIGITAL SKILLS

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Executive summary

Today's digital world, with its massive amounts of information and misinformation, requires an unprecedented level of fluidity from students. They must be able to distinguish fact from opinion, objectivity from bias, and honesty from insincerity in an online setting. They must understand the risks of technology and the internet, and how to mitigate those risks. At the same time, the digital world requires them to have the soft skills of an adapter, a creator, a problem solver, and a critical thinker.

As technology transforms every aspect of our lives, and the world is rapidly shaped by artificial intelligence (AI), students who are digital-, data-, and media-literate will have a significant advantage over their peers. Digital skills are now essential for all professions, from science and engineering to healthcare and finance, and even the arts. It is crucial that students learn digital skills so they can compete in the job market and contribute positively to society and the economy. They also need digital skills to be savvy enough to recognize misinformation and not fall prey to the dangers of disinformation and

fake news, which can imbue students with a distorted world view or mistrust of media.

Our research reveals that secondary school students are not sufficiently confident in the digital skills required to thrive in the 21st century. This is particularly pronounced in certain student cohorts, such as those in rural areas. Rural students face a double inequality – less access to technology and less teaching of digital skills than their urban peers. Even among older secondary school students (aged 16–18), who are closest to joining the workforce, confidence is low.

The majority of teachers and parents in our global survey agree that students need digital skills for their entry into the workforce. However, parents overestimate their children's confidence in these skills. It could also be that students are underestimating their digital skills. Across 16–18-year-old students in our survey, only 55% say they have the digital skills necessary for success. Yet, when their parents and teachers were asked, 70% of teachers and 64% of parents believed the students were well equipped with the

Executive summary

necessary digital skills. Our research revealed that 16–18-year-old students are generally confident in basic digital literacy but struggle with the digital skills required in the workforce. For example, only 53% of 16–18-year-old students feel confident in knowing whether information online is biased, and only 47% are confident in writing a professional email (i.e., understanding the appropriate structure, voice, tone, and correct grammar).

Our research also highlighted that the majority of teachers globally regard working and interacting with AI as a key skill for jobs in the future. At the same time, teachers are cautious of the effects that generative AI systems such as ChatGPT could have on student learning outcomes. Despite this, half of the teachers in our survey believe that the benefits of ChatGPT as an educational tool outweigh the risks, and 56% believe curriculum and assessments should be adapted to account for student use of AI-generated content.

Significant societal and corporate investment has already been made in educating youth in digital skills. State and local governments, along with educators, and with the support of parents, can take further

steps to improve students' confidence in their digital skills and better prepare them for the workforce. These includes mandating digital and media literacy as an educational requirement, sharing and mobilizing knowledge on digital skills, encouraging corporations to be part of the learning ecosystem, and engaging parents in meaningful ways to support digital skills learning.

55%

of students aged 16–18 say they have the digital skills necessary to be successful in today's workforce.

Introduction

In today's interconnected world, as technology especially AI plays a larger role in all aspects of daily life, the future success of students depends on their digital literacy. Teaching digital skills to young children and teenagers in secondary education is crucial, particularly in a world that is being rapidly shaped and transformed by AI. It allows them to engage with technology safely and responsibly and equips them with the tools they need to succeed in a changing world. Despite growing up surrounded by technology, not all of today's students have the digital skills required to use technology effectively and confidently for their education, or for their future role in the workforce. The digital divide is not just about access to internet and devices, but about the proficiency gap between students who have the digital skills to succeed and those who do not. Addressing these gaps can help support the UN Sustainable Development Goals (SDGs), including Goal 4 (providing equitable access to quality education) and Goal 8 (enabling decent work and economic growth).

Previous studies suggest the digital skills gap exists at all levels of education, and even in the workplace. In the OECD's 2018 Programme for International Student Assessment (PISA), 15-year-olds were

Introduction

asked whether they were trained in certain digital skills at school. On average, 54% of students said they were taught how to detect whether information online is subjective or biased, and 41% said they learned how to detect phishing or spam emails.[1] Today's digital world is inundated with misinformation and disinformation, and children are at risk of believing a distorted view of the world. A UK study of 12–15-year-olds found more than half go on social media for their regular news; and that half are worried about not being able to spot fake news.[2]

If unaddressed, these skills gaps extend into post-secondary education and beyond, as students enter the workforce. Our 2017 research on digital talent established that the digital talent gap is widening; employees are anxious that their skill sets are becoming outdated, and employers believe the talent gap impacts their company's competitive advantage.[3] Our latest research sought to explore such questions as: Why do these gaps exist so early on in a student's educational journey? How confident are students in their digital skills? What hard and soft skills are students learning today to

prepare them for the workforce of tomorrow? How can educators better equip and train secondary school students for a digital world?

To address these questions and themes, we conducted a global survey of teachers, parents, and students across nine countries: Australia, Finland, France, Germany, Japan, the Netherlands, Singapore, the United Kingdom, and the United States. We also interviewed education experts. Survey respondents comprised:

1,800	teachers from public/state secondary schools;
4,500	parents of public/state secondary school students;
900	public/state secondary school students aged 11–18.

Introduction

In this research, we define "digital skills" as competence in the four categories below, not merely as being able to navigate social media, post photos/videos to social media, and use a smartphone. Digital skills comprise:

digital literacy
(e.g., understanding how computers, the internet, and mobile devices work);

digital citizenship
(e.g., engaging in appropriate and responsible behavior online);

data literacy
(e.g., understanding how to work with data and how to analyze and interpret it);

media literacy
(e.g., understanding how to determine which online sources are credible and being able to evaluate content online).

We define "secondary education" generally as middle and high school grades (or in some countries as lower and upper secondary levels). Students are typically between 11 and 18 years old, although there is some variation by country. For more details on the country distinctions in these definitions as well as the survey sample, please refer to the Appendix.

Introduction

This report comprises five sections as follows:

01

Rural students face a double inequality: less access to technology and less teaching of digital skills.

02

Digital skills are critical for students' futures, yet teachers overestimate the confidence of their students.

03

Students are competent with basic digital literacy but struggle with the skills required for the 21st-century workforce.

04

Generative AI is a key skill for future jobs and has the potential to disrupt education.

05

Recommendations: How secondary school students can be better prepared with digital skills.

RURAL STUDENTS FACE A DOUBLE INEQUALITY: LESS ACCESS TO TECHNOLOGY AND LESS TEACHING OF DIGITAL SKILLS

"Disparities in education is a phenomenon that we have observed for a very long time and predates technology. Social background, gender, geography – they all leave their footprint on educational outcomes. Technology, however, is an amplifier and accelerator in this. As an example, during the pandemic, students who were well-off, who had experience with technology or who had good access to it, were empowered in their learning. Other students were left behind. In the future, we must close these gaps very early in the educational journey, because any later is an uphill struggle."

Andreas Schleicher
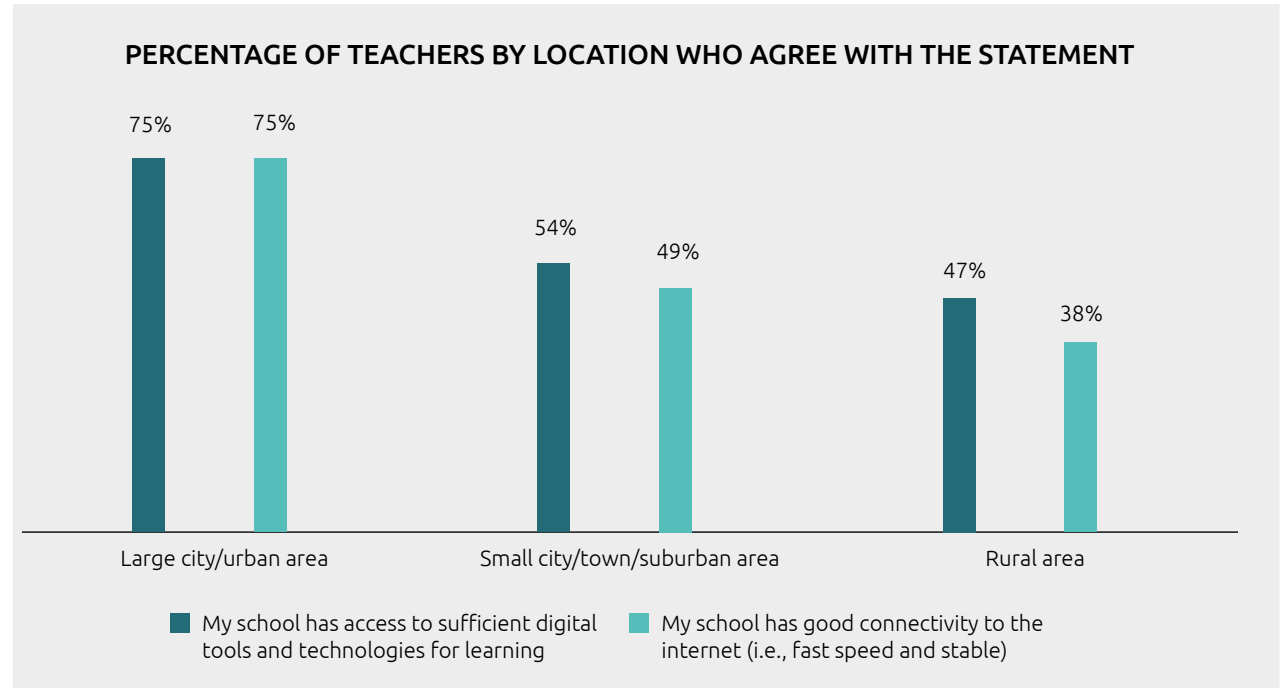Director for Education
and Skills, OECD

Rural teachers have less access to digital learning technologies and stable internet than urban teachers

The urban-rural divide in access to digital technologies and the internet is well-documented. Globally, the share of internet users in urban areas is twice as high as in rural areas.[4] In our 2020 digital divide research, we found that cost is a significant driver of why rural populations are offline.[5] Our current research reveals a similar divide in education, with rural teachers the most likely to lack access to digital tools and a good internet connection. Our research revealed that 75% of urban teachers say their school has access to sufficient digital learning technologies, and 75% say that it has good internet connectivity, compared to only 47% and 38%, respectively, of rural teachers (see Figure 1).

Rural schools do not prioritize the teaching of digital skills like urban schools do

Given the digital divide between rural and urban schools, it is not surprising that there is a difference in teachers' views

Figure 1

Urban teachers have sufficient learning technologies and a good internet connection

PERCENTAGE OF TEACHERS BY LOCATION WHO AGREE WITH THE STATEMENT

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,800 secondary school teachers.

of their school's priority in teaching digital skills. Teachers in rural areas are less likely to believe digital-, data-, and media-literacy is a priority for their school than their peers in suburban and urban areas. For example, 67% of rural teachers say digital literacy is important, compared to 81% of suburban and 94% of urban teachers (see Figure 2).

Figure 2

Urban schools prioritize digital skills

PERCENTAGE OF TEACHERS BY LOCATION WHO SAY IT IS A PRIORITY OF THEIR SCHOOL TO TEACH STUDENTS DIGITAL SKILLS
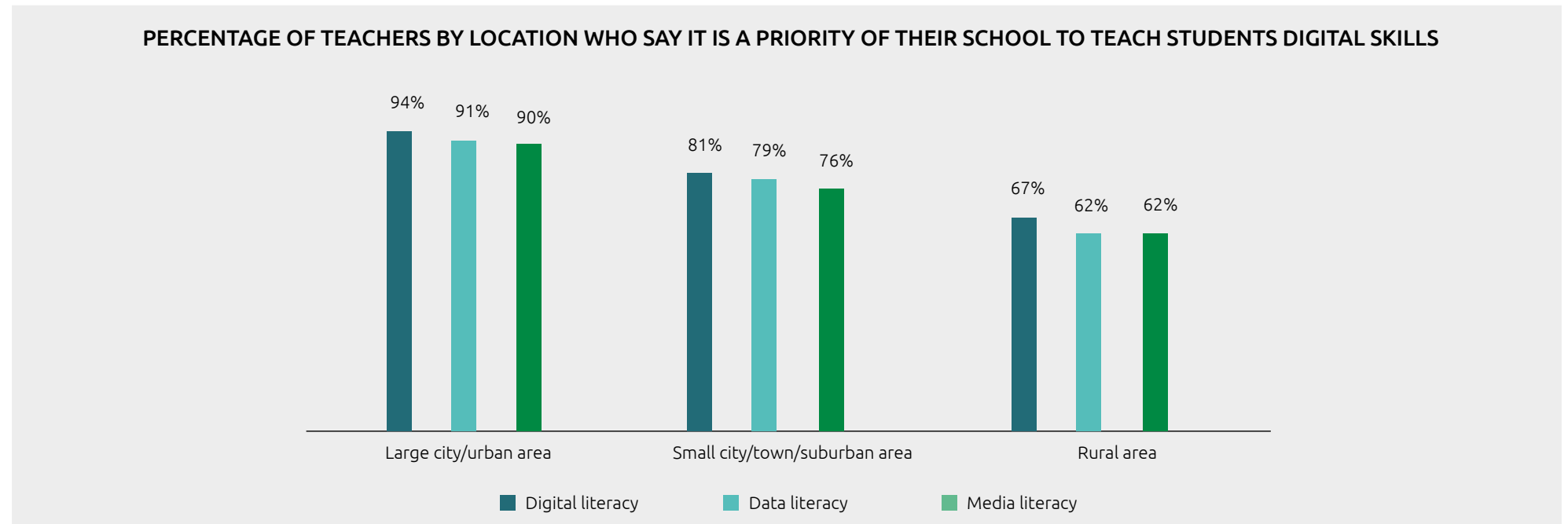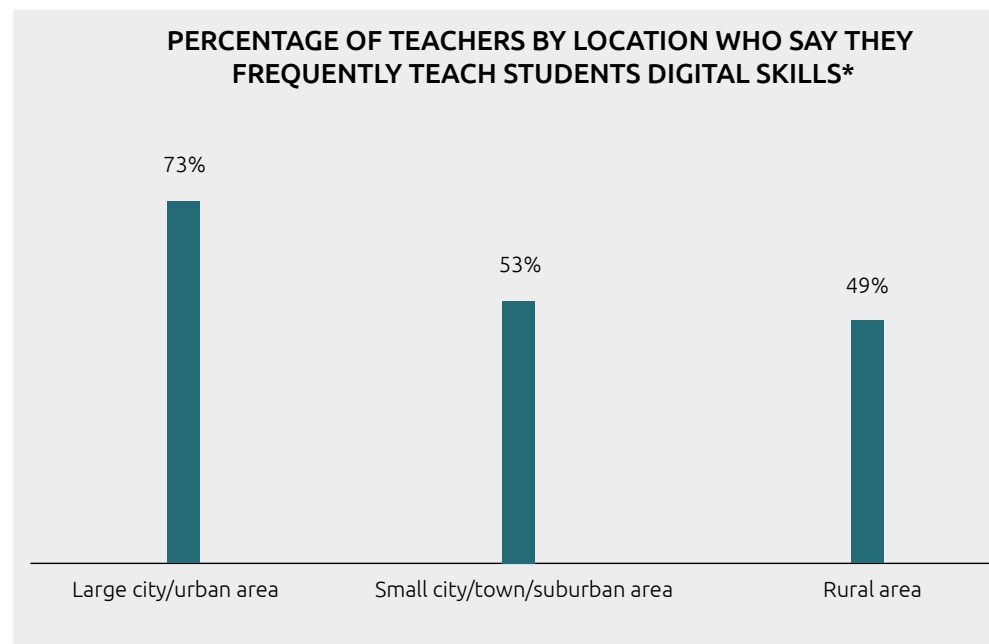

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,800 secondary school teachers.

Figure 3

Urban teachers frequently teach digital skills

Rural teachers are teaching digital skills less frequently than urban teachers

Our survey also revealed that urban teachers are more confident in teaching digital skills than rural teachers (85% versus 51%). It is not surprising, therefore, that teachers in rural areas teach digital skills less often than their urban and suburban peers. On average, 49% of rural teachers say they frequently teach digital skills versus 73% in urban areas (see Figure 3). The majority (71%) of rural teachers in our survey say their school does not have a formal digital skills curriculum and they must incorporate digital skills into their lessons independently.

PERCENTAGE OF TEACHERS BY LOCATION WHO SAY THEY FREQUENTLY TEACH STUDENTS DIGITAL SKILLS*

Large city/urban area	Small city/town/suburban area	Rural area
73%	53%	49%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,800 secondary school teachers.
*Teachers were asked to rate their frequency of teaching digital skills in their classroom on a scale of 1 to 7, where 1=never and 7=very frequently.
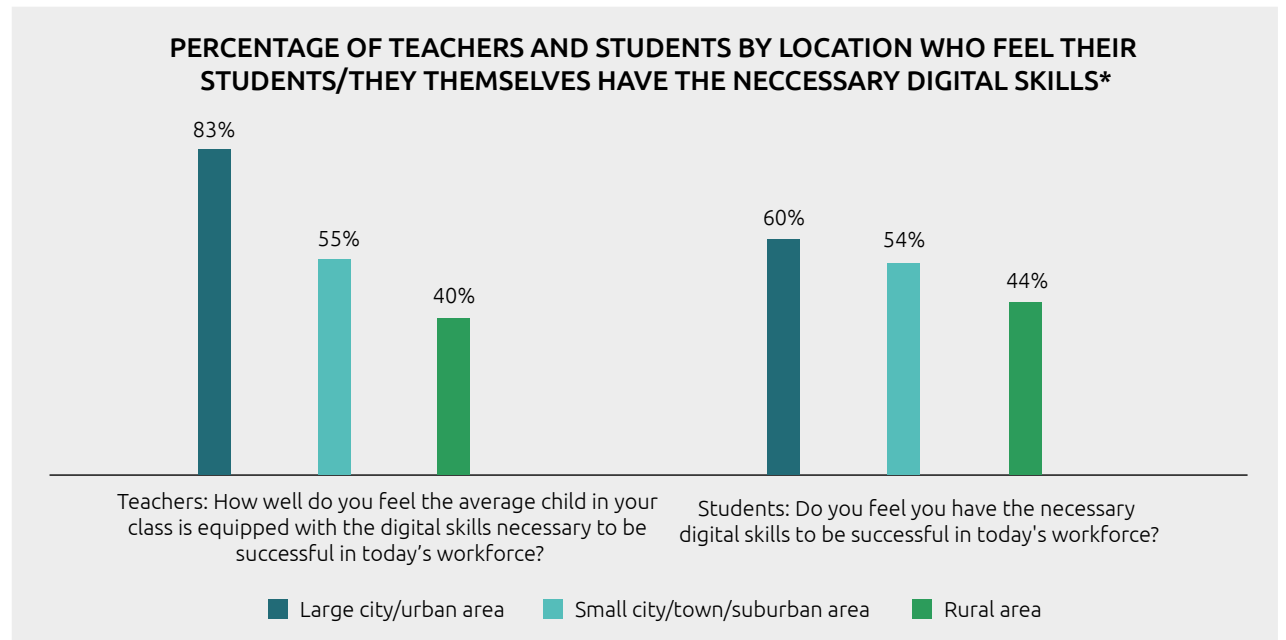
71%

of rural teachers in our survey say their school does not have a formal digital skills curriculum and they must incorporate digital skills into their lessons independently.

Figure 4

Urban students are well equipped with digital skills required for the workforce

Rural students do not feel they have the digital skills required for the workforce

This urban–rural digital divide in terms of the priority given to digital skills and the amount of time devoted to teaching them is reflected in our findings on how well equipped students are with the digital skills needed for the workforce. Fewer teachers in rural areas than in urban and suburban locations believe their students have these skills (40% of rural teachers compared to 83% of teachers in urban areas). Similarly, a lower share of 16–18-year-old students in rural areas say they are equipped with digital skills necessary for success compared to their urban and suburban counterparts (see Figure 4).

PERCENTAGE OF TEACHERS AND STUDENTS BY LOCATION WHO FEEL THEIR STUDENTS/THEY THEMSELVES HAVE THE NECCESSARY DIGITAL SKILLS*

83%

55%

40%

60%

54%

44%

Teachers: How well do you feel the average child in your class is equipped with the digital skills necessary to be successful in today's workforce?

Students: Do you feel you have the necessary digital skills to be successful in today's workforce?

■ Large city/urban area   ■ Small city/town/suburban area   ■ Rural area

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,800 secondary school teachers, N=304 secondary school students aged 16–18.
*Teachers and students were asked to rate their answers to the question on a scale of 1 to 7, where 1=not at all equipped to 7=highly equipped.

Figure 5

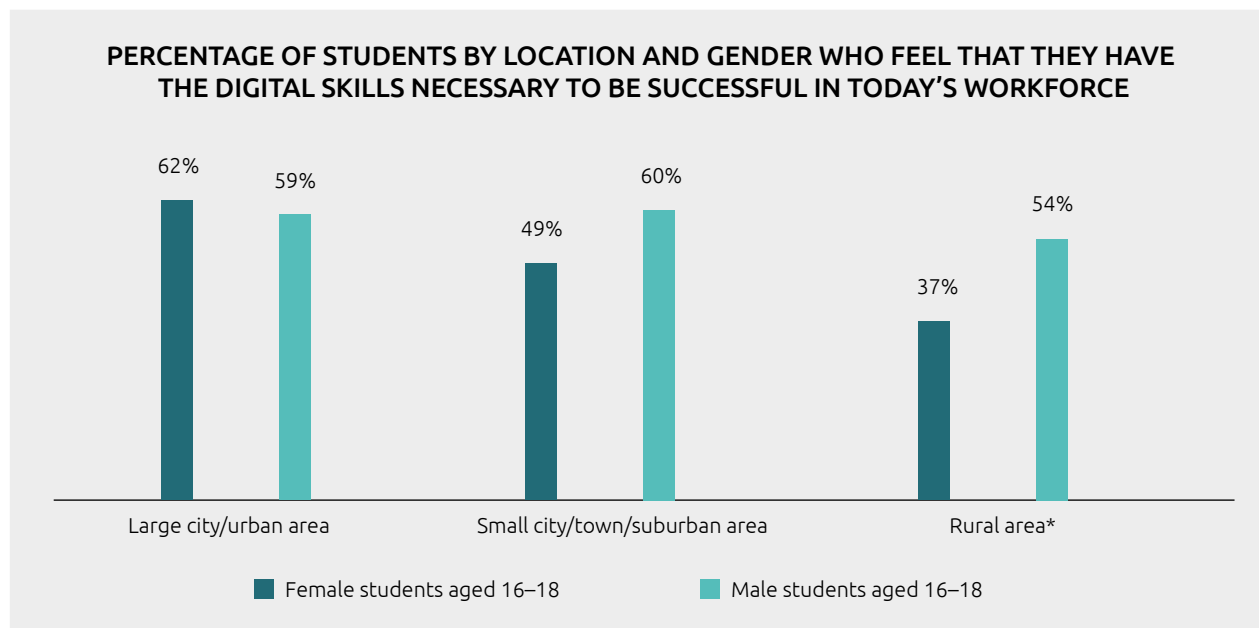## Female rural students are at the greatest disadvantage compared to their urban peers

Our survey revealed that the urban–rural divide is more marked among female students. Of female students in rural areas, 37% say they have the required digital skills for the workforce compared to 62% of their peers in urban areas (see Figure 5). This discrepancy is significantly smaller for their male counterparts in our survey.

37%

of rural female students say they have the required digital skills for the workforce compared to 62% of their peers in urban areas.

Urban female students are better equipped with digital skills for the workforce than their suburban and rural peers

PERCENTAGE OF STUDENTS BY LOCATION AND GENDER WHO FEEL THAT THEY HAVE THE DIGITAL SKILLS NECESSARY TO BE SUCCESSFUL IN TODAY'S WORKFORCE

Large city/urban area — 62% / 59%
Small city/town/suburban area — 49% / 60%
Rural area* — 37% / 54%

■ Female students aged 16–18　　■ Male students aged 16–18

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=147 secondary female students aged 16–18.

*The sample size for male students in rural areas is not large enough to be statistically significant; it is purely directional.

The confidence of students in their digital skills varies by their household income level

Low-income students are less confident in digital skills than their high-income peers

When analyzing secondary school students' confidence in digital skills by their annual household income level, differences emerge between the students in the lowest and the highest income tier. For example, only 38% of students whose parents reported the lowest income in our survey say they are confident creating a presentation using charts and text (e.g., Microsoft PowerPoint, Google Slides) compared to 52% of their peers in the highest income category. Conversely, 72% of low-income students say they are confident in understanding how to stop cyberbullying (e.g., not responding/retaliating, blocking, reporting) versus only 61% of the high-income students in our survey (see Figure 6).
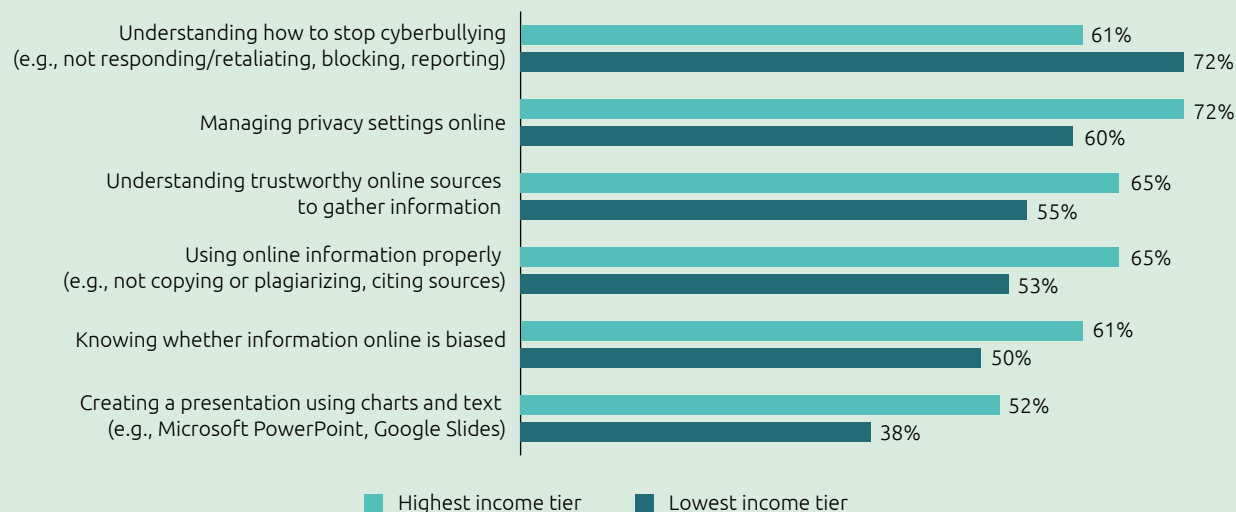
38%

of students whose parents reported the lowest income in our survey say they are confident creating a presentation using charts and text compared to 52% of their peers in the highest income category.

Figure.6

A smaller share of low-income students have confidence in digital skills than their high-income peers

CONFIDENCE IN DIGITAL SKILLS AMONG ALL SECONDARY SCHOOL STUDENTS AGED 11–18 BY ANNUAL HOUSEHOLD INCOME TIER*

Understanding how to stop cyberbullying (e.g., not responding/retaliating, blocking, reporting)
- Highest income tier: 61%
- Lowest income tier: 72%

Managing privacy settings online
- Highest income tier: 72%
- Lowest income tier: 60%

Understanding trustworthy online sources to gather information
- Highest income tier: 65%
- Lowest income tier: 55%

Using online information properly (e.g., not copying or plagiarizing, citing sources)
- Highest income tier: 65%
- Lowest income tier: 53%

Knowing whether information online is biased
- Highest income tier: 61%
- Lowest income tier: 50%

Creating a presentation using charts and text (e.g., Microsoft PowerPoint, Google Slides)
- Highest income tier: 52%
- Lowest income tier: 38%

■ Highest income tier   ■ Lowest income tier

72%

of low-income students say they are confident in understanding how to stop cyberbullying versus only 61% of the high-income students in our survey.

Figure.7

Low-income students are less confident in leadership but more confident in creativity and time management

Similarly, there are differences in confidence in soft skills between students in low-income and high-income households. For example, 65% of students with parents in the highest income tier say they are confident in leadership (i.e., taking initiative, motivating others, and leading by example) compared to 47% of their peers in the lowest income tier. Conversely, 69% of low-income students say they are confident in time management (i.e., managing their time effectively and balancing academic work and extracurricular activities) versus only 52% of the high-income students in our survey (see Figure 7).

A larger share of low-income students is confident in creativity and time management than their high-income peers
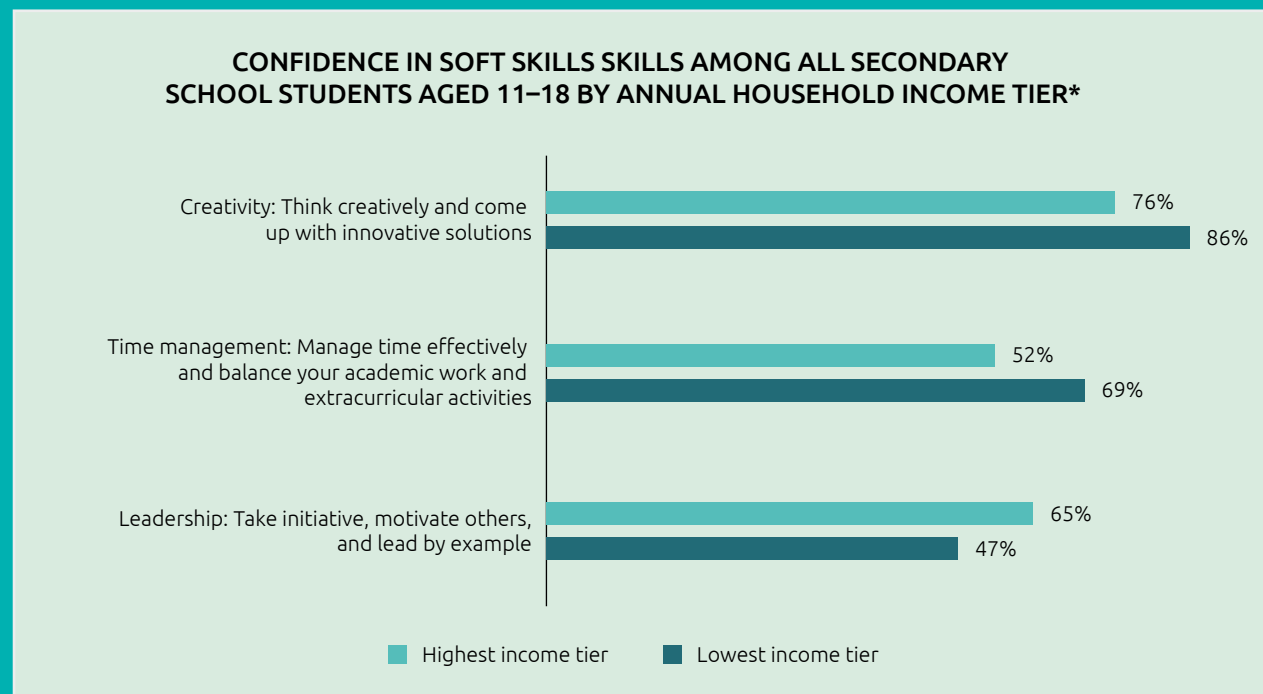
CONFIDENCE IN SOFT SKILLS SKILLS AMONG ALL SECONDARY SCHOOL STUDENTS AGED 11–18 BY ANNUAL HOUSEHOLD INCOME TIER*

Creativity: Think creatively and come up with innovative solutions — 76% / 86%

Time management: Manage time effectively and balance your academic work and extracurricular activities — 52% / 69%

Leadership: Take initiative, motivate others, and lead by example — 65% / 47%

■ Highest income tier   ■ Lowest income tier

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=58 secondary school students aged 11–18 in the lowest fifth for annual household income tier, N=155 secondary school students aged 11–18 in the highest fifth annual household income tier.

*Note that the lowest and highest annual household income tier varies with each country and is representative of that country's population.

DIGITAL SKILLS ARE CRITICAL FOR STUDENTS' FUTURES, YET TEACHERS OVERESTIMATE THE CONFIDENCE OF THEIR STUDENTS
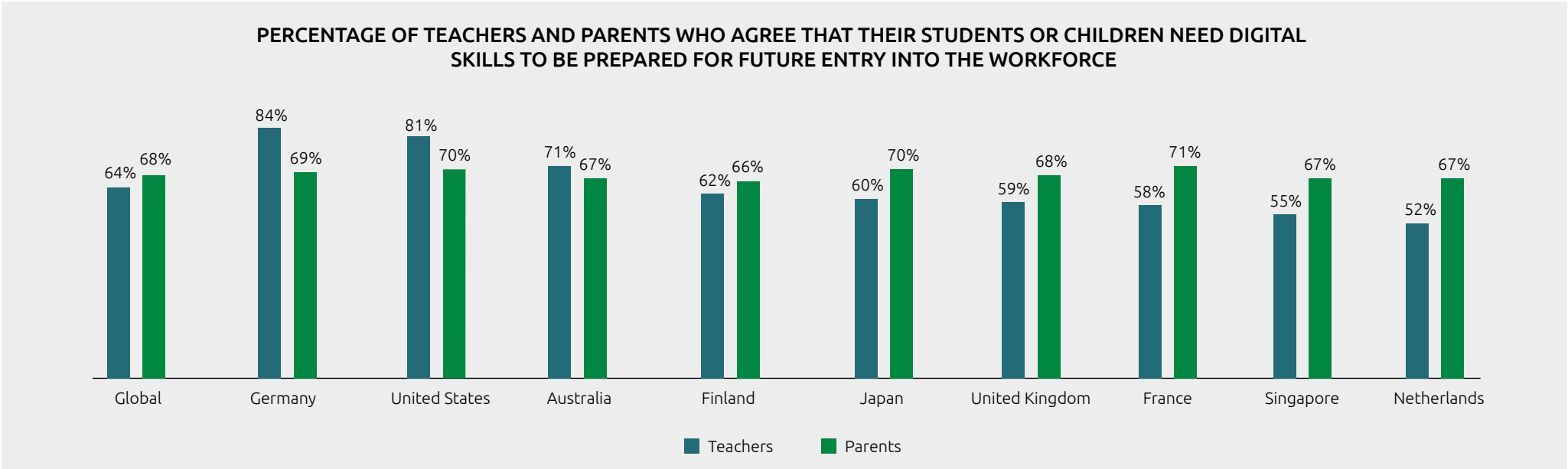
Digital skills are a prerequisite for the 21st-century workforce

Students need digital skills, not only to be able to confidently use technology in their education, but also to prepare them for future entry into the workforce. In our survey, 64% of teachers and 68% of parents agree with this statement. In six of the nine countries, the percentage of parents who agree with the statement is higher than the percentage of teachers. This could suggest that parents in our survey – the majority of whom are employed full time – are more familiar with the skills employees need, given their presence in the workforce, and that secondary school teachers are further removed from the practical needs of employers (see Figure 8).

Figure.8

Most teachers and parents globally say students need digital skills for the workforce

PERCENTAGE OF TEACHERS AND PARENTS WHO AGREE THAT THEIR STUDENTS OR CHILDREN NEED DIGITAL SKILLS TO BE PREPARED FOR FUTURE ENTRY INTO THE WORKFORCE

	Teachers	Parents
Global	64%	68%
Germany	84%	69%
United States	81%	70%
Australia	71%	67%
Finland	62%	66%
Japan	60%	70%
United Kingdom	59%	68%
France	58%	71%
Singapore	55%	67%
Netherlands	52%	67%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,800 secondary school teachers, N=4,500 parents of secondary school students.

Teachers believe older students are more prepared with digital skills than these students feel to be the case

Across all students in our survey aged 16–18, slightly more than half (55%) say they have the digital skills necessary to be successful in today's workforce. Both their parents and their teachers overestimate their digital skills preparedness (see Figure 9). It could also be that students are underestimating their abilities in digital skills. Andreas Schleicher, Director for Education and Skills at the OECD, says: *"The differing perspectives between teachers' and students' views of abilities extends beyond digital literacy. Simply, teachers assume that they teach extremely well, so students must know everything they have taught. The reality is a lot gets lost in translation."*

Figure.9

Fewer students feel equipped with digital skills for the workforce than their teachers perceive

Our research revealed differences across gender and location in high school teachers' views of how prepared their students are with digital skills:

- Male high school teachers believe their students to be better equipped with digital skills (81%) versus female teachers (68%).

- High school teachers working in urban areas believe their students to be better equipped with digital skills (85%) versus their peers in suburbs (57%) and rural areas (42%).

PERCENTAGE OF TEACHERS*, PARENTS**, AND STUDENTS*** WHO BELIEVE THAT THEIR STUDENTS/CHILDREN/THEY THEMSELVES ARE EQUIPPED WITH THE DIGITAL SKILLS NECESSARY TO BE SUCCESSFUL IN TODAY'S WORKFORCE
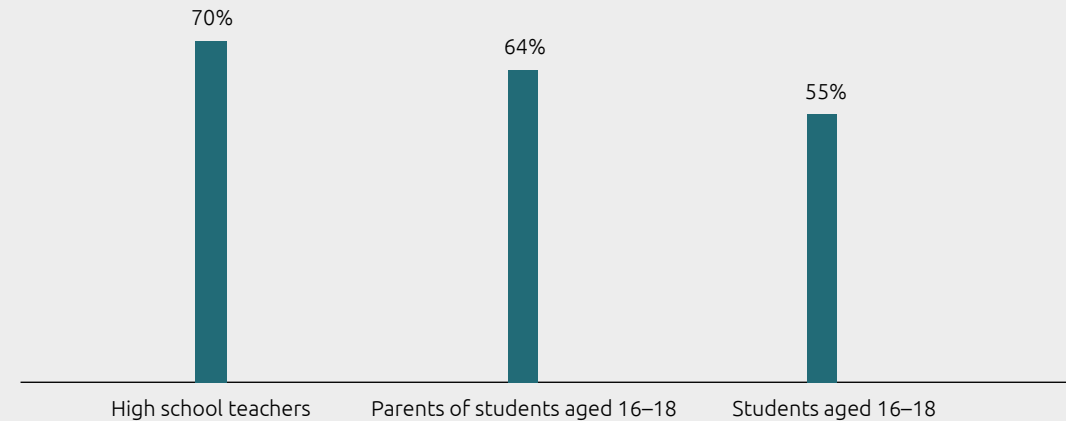
High school teachers	Parents of students aged 16–18	Students aged 16–18
70%	64%	55%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,217 high school teachers, N=2,053 parents with at least one child aged 16 or older, N=304 students aged 16–18 years old.
*Question asked of teachers: How well do you feel the average child in your class is equipped with the digital skills necessary to be successful in today's workforce? Please rate on a scale of 1 to 7, where 1=not at all equipped to 7=highly equipped.
**Question asked of parents: How well do you feel your child's school has equipped him/her with the digital skills necessary to be successful in today's workforce? Please rate on a scale of 1 to 7, where 1=not at all equipped to 7=highly equipped.
***Question asked of students: Do you feel you have the digital skills necessary to be successful in today's workforce? Please rate on a scale of 1 to 7, where 1=not at all equipped to 7=highly equipped.

The gap between high school teachers and students is larger than the global average in certain countries:

- In the UK, 73% of high school teachers say their students are equipped with digital skills compared to 40% of students aged 16–18 who say the same.

- In Australia, 75% of high school teachers say their students are equipped with digital skills compared to 46% of students aged 16–18 who say the same.

- In Germany, 78% of high school teachers say their students are equipped with digital skills compared to 62% of students aged 16–18 who say the same.
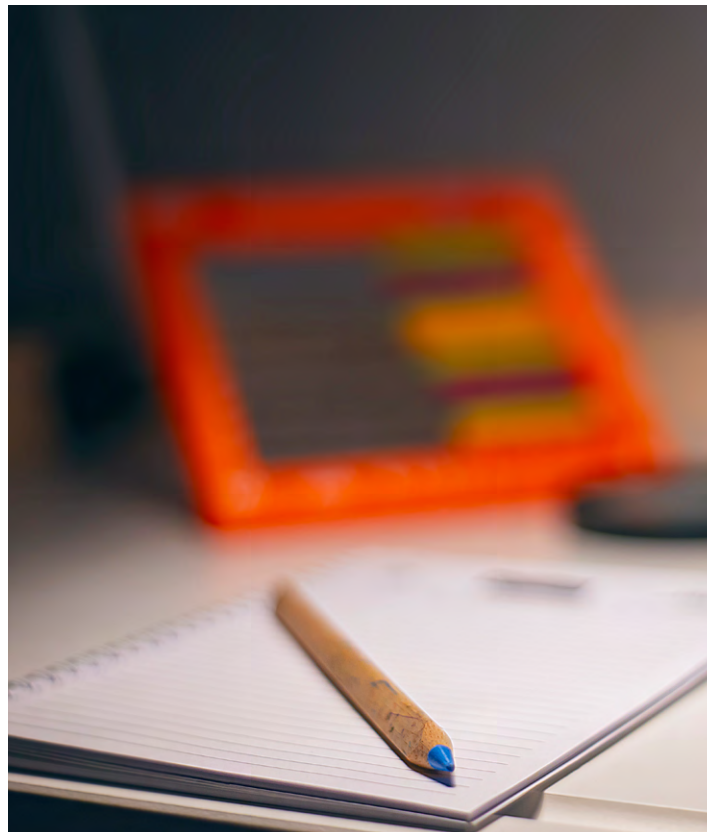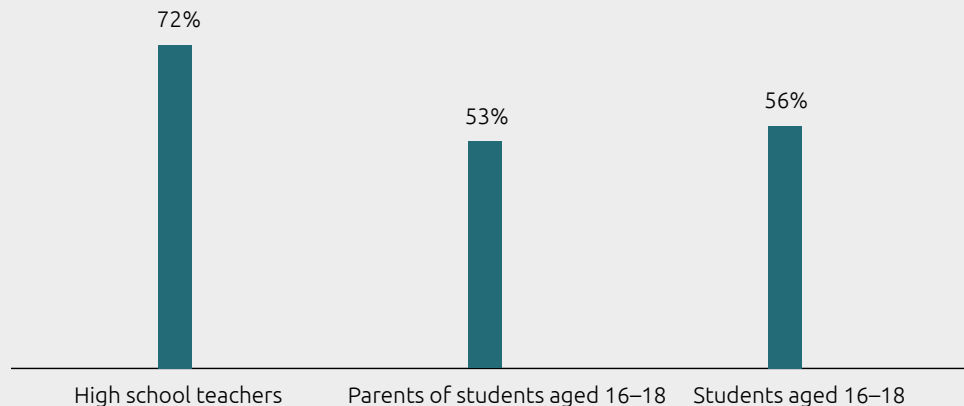
Teachers are more satisfied than older students with how their school has prepared its students with digital skills

Among parents with at least one child aged 16–18 in our survey, 53% say they are satisfied that their child's school has prepared their child with the digital skills needed for the workforce. A slightly higher share (56%) of students agrees, as does a significantly higher share of teachers (72%) (see Figure 10).

Figure.10

Fewer students feel satisfied with their school than their teachers perceive

PERCENTAGE OF TEACHERS*, PARENTS**, AND STUDENTS*** WHO ARE SATISFIED THAT THEIR SCHOOL HAS PREPARED ITS STUDENTS/CHILDREN/ THEMSELVES WITH THE DIGITAL SKILLS NEEDED FOR THE WORKFORCE

- High school teachers: 72%
- Parents of students aged 16–18: 53%
- Students aged 16–18: 56%

The gap between high school teachers and students is larger than the global average in certain countries:

- In the UK, 85% of high school teachers say their students are satisfied with their school's teaching of digital skills, compared to 51% of students aged 16–18 who say the same.

- In France, 79% of high school teachers say their students are satisfied with their school's teaching of digital skills, compared to 54% of students aged 16–18 who say the same.

- In the US, 72% of high school teachers say their students are satisfied with their school's teaching of digital skills, compared to 50% of students aged 16–18 who say the same.

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,217 high school teachers, N=2,053 parents with at least one child aged 16 or older, N=304 students aged 16–18 years old.
*Question asked of teachers: How satisfied are you that your school has prepared its students with the digital skills needed for the workforce? Please rate on a scale of 1 to 7, where 1=not at all satisfied to 7=highly satisfied.
**Question asked of parents: How satisfied are you that your child's school has prepared him/her with the digital skills needed for the workforce? Please rate on a scale of 1 to 7, where 1=not at all satisfied to 7=highly satisfied.
***Question asked of students: Are you satisfied that your school has prepared you with the digital skills needed for the workforce? Please rate on a scale of 1 to 7, where 1=not at all satisfied to 7=highly satisfied.
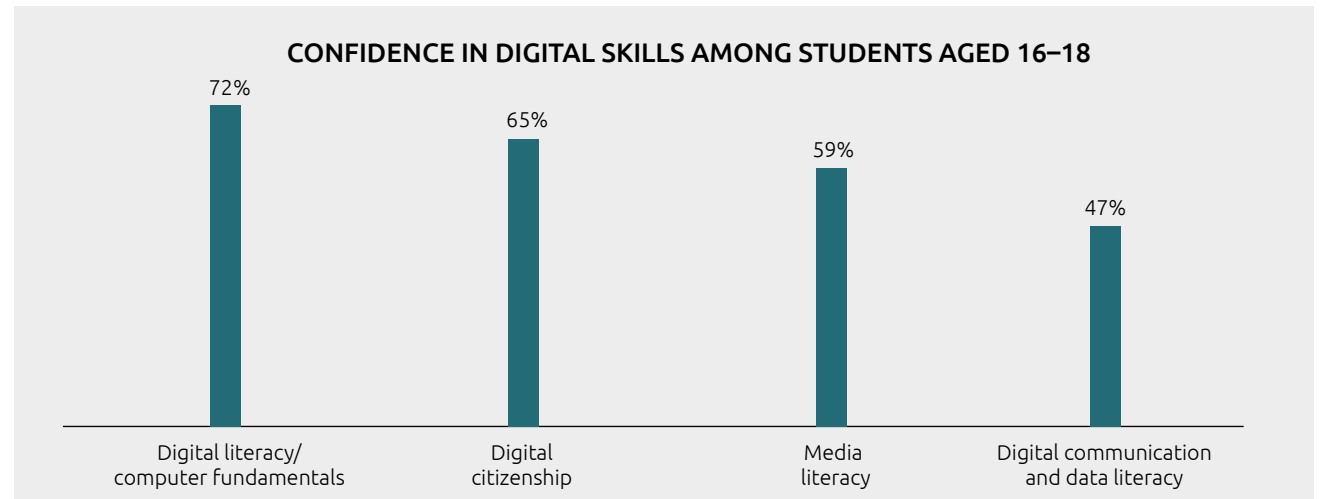
STUDENTS FEEL COMPETENT WITH BASIC DIGITAL LITERACY BUT STRUGGLE WITH THE SKILLS REQUIRED FOR THE 21ST-CENTURY WORKFORCE

Figure.11

Confidence in digital skills varies greatly among students aged 16–18

Students are most confident with the basics of digital literacy

One-third of students in our survey aged 16–18 say they plan to get a job after completing high school (or the equivalent). Many of those students that are closest to entering the workforce have the fundamental digital skills required by employers today, such as finding information online, using computer applications, and typing/ keyboarding. Fewer of these students have the digital communication and data skills required to be successful in today's workforce (see Figure 11).

CONFIDENCE IN DIGITAL SKILLS AMONG STUDENTS AGED 16–18

Digital literacy/ computer fundamentals	Digital citizenship	Media literacy	Digital communication and data literacy
72%	65%	59%	47%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=304 students aged 16–18 years old.

Students lack the digital communication and data skills required for success in the workplace

Less than half (47%) of students aged 16–18 are confident in writing a professional email. This is a skill that is critical in today's workforce where the medium of formal communication is often digital, and because young students today often have more experience writing informal messages via text or on social media. Even fewer are confident in creating a presentation (45%) or making a chart from data (42%) (see Figure 12). Making charts from data is an area where teachers may overestimate their students' abilities: 76% of high school teachers say their students are confident in this skill, compared to only 42% of students themselves. How to write a professional
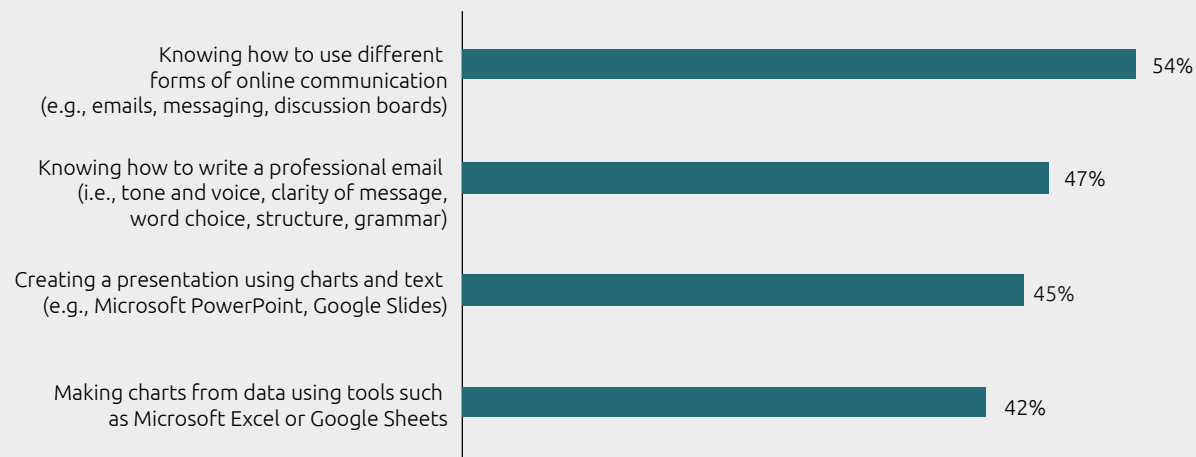
Figure.12

Fewer than half of students aged 16–18 are confident in writing a professional email

email is another skill in which high school teachers in our survey overestimate the confidence of their students. Over three-quarters (76%) of high school teachers say their students are confident compared to only 47% of students.

Among the eldest students in our survey (aged 17 and 18), there are differences by gender. For example, young women aged 17 and 18 are more likely than young men of the same age to say they are confident in:

• knowing how to write a professional email (55% women versus 43% men);

• knowing how to use different forms of online communication (60% women versus 50% men).

CONFIDENCE IN DIGITAL COMMUNICATION AND DATA LITERACY SKILLS AMONG STUDENTS AGED 16–18

Knowing how to use different forms of online communication (e.g., emails, messaging, discussion boards) — 54%

Knowing how to write a professional email (i.e., tone and voice, clarity of message, word choice, structure, grammar) — 47%

Creating a presentation using charts and text (e.g., Microsoft PowerPoint, Google Slides) — 45%

Making charts from data using tools such as Microsoft Excel or Google Sheets — 42%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=304 students aged 16–18 years old.

Students are less adept at spotting biased information and advertising online

The majority (80%) of 16–18-year-old students say they are confident in finding information online using websites such as Google or Yahoo!, but fewer (66%) know which online sources to trust, or what is fact versus opinion online (61%). About half (53%) of these students say they know whether information online is biased, dropping to 41% of students aged 18. Only 53% say they know whether online content is advertising (see Figure 13). A national study of 3,446 American high school students by the Stanford Graduate School of Education found that nearly all studen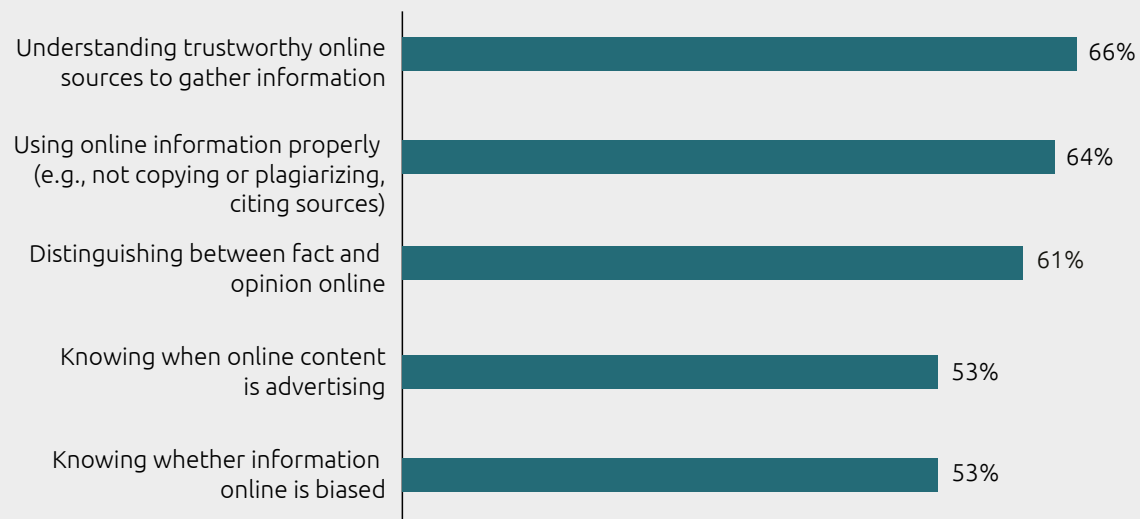ts fared poorly when given online tasks that assessed their abilities in detecting misinformation and fake news.[6] The danger of misinformation and fake news to children is particularly acute as they could be persuaded to believe a distorted view of the world that might cause them or others harm. Not only does it erode children's trust in media, but it can increase their anxieties and cause self-esteem problems.[7] A UK study of 12–15-year-olds found more than half go on social media for their regular news, and that half are worried about not being able to spot fake news.[8]

Figure.13

Around half of students aged 16–18 are confident in spotting online advertising or biased online information

CONFIDENCE IN MEDIA LITERACY SKILLS AMONG STUDENTS AGED 16–18

Skill	Percentage
Understanding trustworthy online sources to gather information	66%
Using online information properly (e.g., not copying or plagiarizing, citing sources)	64%
Distinguishing between fact and opinion online	61%
Knowing when online content is advertising	53%
Knowing whether information online is biased	53%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=304 students aged 16–18 years old.

53%

of students aged 16–18 say they know whether information online is biased.

Among the eldest students in our survey (aged 17 and 18) there are differences by gender. For example, young women aged 17 and 18 are more likely than young men of that age to say they are confident in:

- using online information properly (75% women versus 57% men);
- knowing when online content is advertising (61% women versus 48% men);
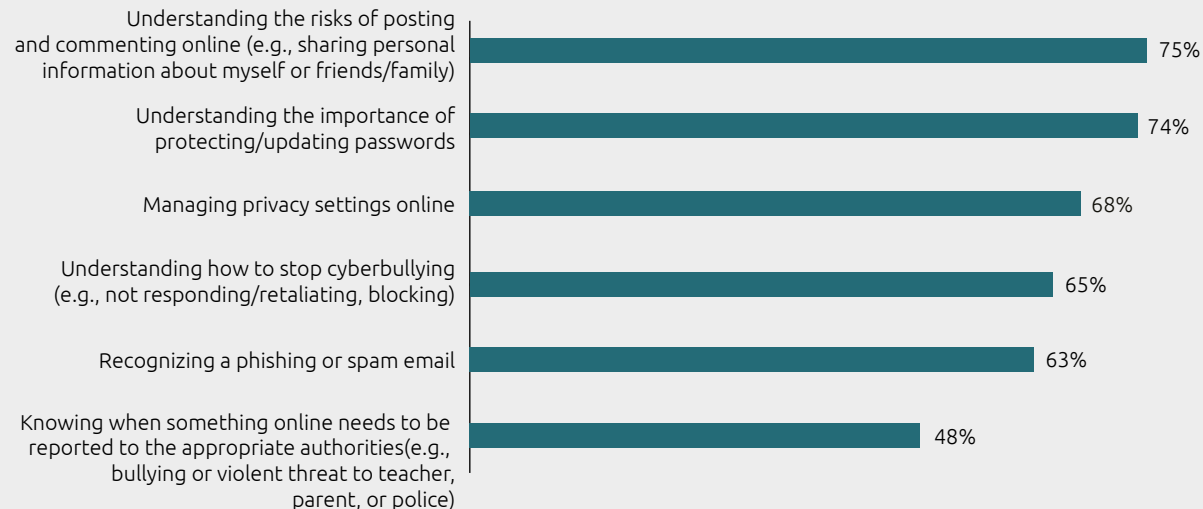- recognizing a phishing or spam email (71% women versus 59% men).

Figure.14

Fewer than half of students aged 16–18 are confident in knowing when an online threat needs to be reported

Students understand the risks of posting online, but many do not know when to report inappropriate or risky behavior

Three-quarters (75%) of 16–18-year-old students in our survey say they understand the risks of posting and commenting online, and the methods to prevent or mitigate cyberbullying (65%) – defined as "willful and repeated harm inflicted through the use of computers, cell phones, or other electronic devices" by the Cyberbullying Research Center. Only 48% of these students, however, say they know when something online needs to be reported to the appropriate "authorities," such as reporting bullying or a violent threat to a teacher, parent, or the police (see Figure 14). A 2019 study of middle and high school students in the US found that 37% of students had been cyberbullied, and 15% admitted to having cyberbullied others.[9]

This is an area where students might inflate their knowledge of the risks, and teachers may be more realistic in their assessment of students' abilities. While 75% of 16–18-year-old students say they understand the risks of posting online, only 55% of high school teachers say their students are confident in that skill.
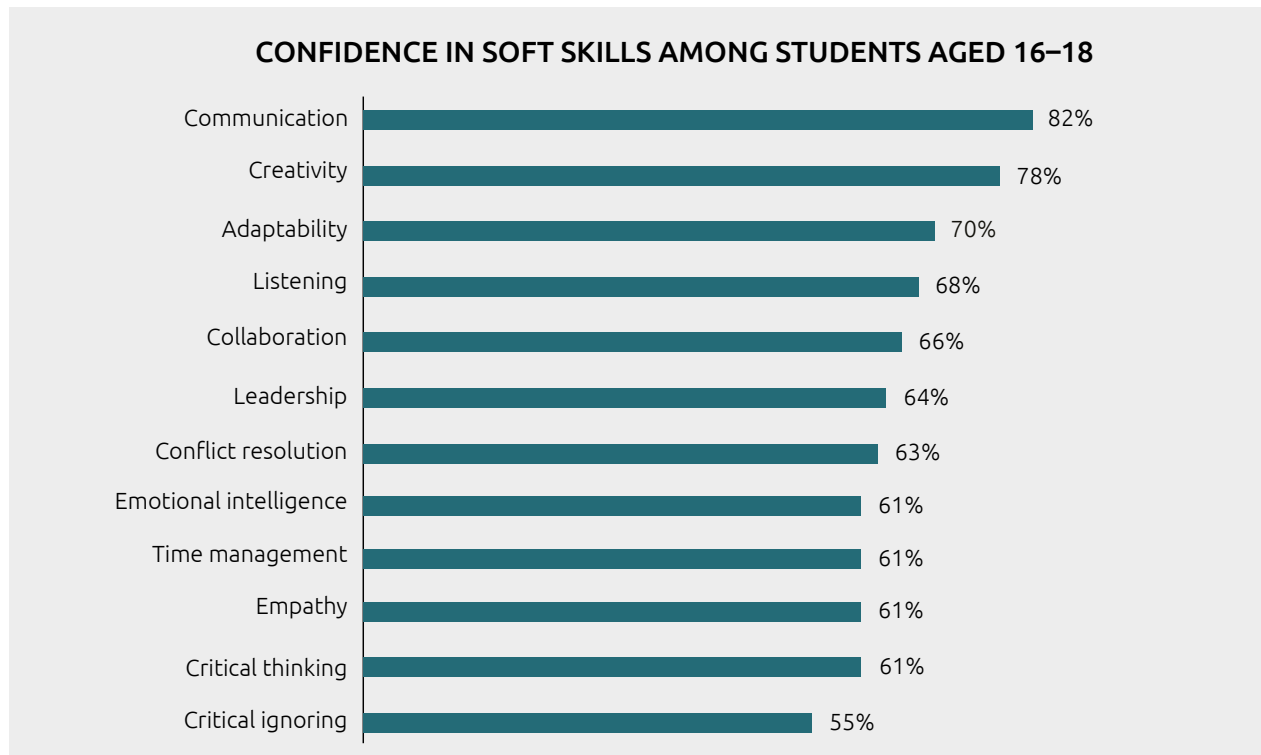
CONFIDENCE IN DIGITAL CITIZENSHIP SKILLS AMONG STUDENTS AGED 16–18

Skill	Percentage
Understanding the risks of posting and commenting online (e.g., sharing personal information about myself or friends/family)	75%
Understanding the importance of protecting/updating passwords	74%
Managing privacy settings online	68%
Understanding how to stop cyberbullying (e.g., not responding/retaliating, blocking)	65%
Recognizing a phishing or spam email	63%
Knowing when something online needs to be reported to the appropriate authorities(e.g., bullying or violent threat to teacher, parent, or police)	48%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=304 students aged 16–18 years old.

Figure.15

Students aged 16–18 are most confident in communication and creative skills and least confident in critical ignoring

CONFIDENCE IN SOFT SKILLS AMONG STUDENTS AGED 16–18

Skill	%
Communication	82%
Creativity	78%
Adaptability	70%
Listening	68%
Collaboration	66%
Leadership	64%
Conflict resolution	63%
Emotional intelligence	61%
Time management	61%
Empathy	61%
Critical thinking	61%
Critical ignoring	55%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=304 students aged 16–18 years old.

A large share of students lack key soft skills for employment

Among 16–18-year-old students in our survey, between 55% and 82% are confident in the 12 soft skills we tested in our survey, including emotional intelligence, time management, empathy, and critical thinking (see Figure 15). Among the eldest students in our survey (aged 17 and 18), there are differences by gender. For example, young women aged 17 and 18 are more likely than young men of that age to say they are confident in critical thinking (62% women versus 52%

men) and critical ignoring (61% women versus 46% men). The OECD's Andreas Schleicher shares the importance of adaptability and social emotional skills today: *"Can you wake up every morning in a different world, or in a different context? This adaptability is so important. The range of cognitive, social, and emotional dimensions will become incredibly important. In the past, people learned once for their lifetime, saw the world through which they learned, and anticipated their future job. That is no longer possible. Now, within a generation, we live through what people lived through in centuries. This creates a much greater pressure to be willing and able to not only learn, but also unlearn and relearn."* Creative thinking and analytical thinking are the most important skills for workers in 2023 and are the top-two fastest-growing skills per the latest Future of Jobs Report from the World Economic Forum. These two skills are also the top two areas for workforce training and upskilling through 2027.[10]

Green skills are increasingly important in today's workforce

Green skills have gained prominence in recent years. In our survey, green skills were defined as the knowledge, abilities, values, and attitudes needed to live in, develop, and support a sustainable and resource-efficient society. They enable an individual to work and live sustainably, thus reducing their impact on the environment and promoting health and well-being.

Green skills unlock new opportunities for students

Green skills enable students to live sustainably and manage their carbon footprint in a more effective manner. These skills can empower students to become changemakers in their own communities. One of the significant benefits of green skills is that they unlock new opportunities in emerging fields related to sustainability, providing a competitive edge in the job market. A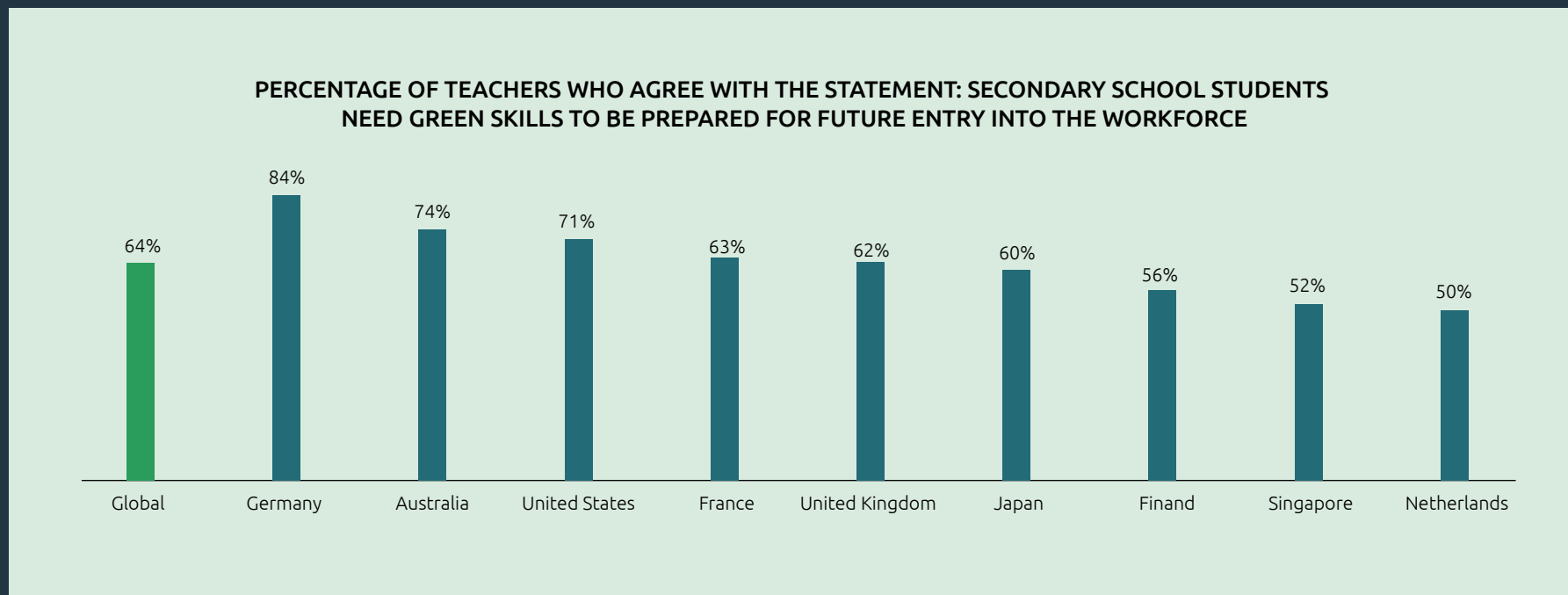s many countries around the word shift to a greener economy, it is estimated that 24 million jobs globally could be created by 2030.[11] The share of green talent in the workforce has increased by more than 38% since 2015, and demand for green talent is outstripping supply in many sectors.[12]

The majority of teachers in our survey echo this sentiment. Almost two-thirds of teachers globally agree that green skills are necessary for future entry into the workforce. This view ranges from 84% among teachers in Germany to 50% among teachers in the Netherlands (see Figure 16). A similar share of parents globally (63%) agree that their child needs green skills to be prepared for future entry into the workforce.

Figure.16

The majority of teachers globally agree that student need green skills for the workforce

PERCENTAGE OF TEACHERS WHO AGREE WITH THE STATEMENT: SECONDARY SCHOOL STUDENTS NEED GREEN SKILLS TO BE PREPARED FOR FUTURE ENTRY INTO THE WORKFORCE

Global	Germany	Australia	United States	France	United Kingdom	Japan	Finand	Singapore	Netherlands
64%	84%	74%	71%	63%	62%	60%	56%	52%	50%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,800 secondary school teachers.

Figure.17

Fewer than 60% of students are knowledgeable about climate change

Students lack knowledge in key green skills

We found that many secondary school students lack knowledge in key green skills. While nearly 80% of students globally in our survey say they are knowledgeable about recycling and waste reduction, only about half say they are knowledgeable about environmental policy (54%) and climate change (58%) (see Figure 17).

There are some differences in knowledge of green skills by student segment, as shown below.

Location in which students live:

• Students in rural areas (66%) are more knowledgeable about sustainable energy than students in urban areas (55%).

Annual household income:

• Students in the lowest income tier (84%) are more knowledgeable about recycling/waste reduction than students in the highest income tier (72%).

• Students in the highest income tier (72%) are more knowledgeable about eco-friendly consumer habits than students in the lowest income tier (57%).

PERCENTAGE OF SECONDARY SCHOOL STUDENTS WHO SAY THEY ARE KNOWLEDGEABLE ABOUT THE BELOW GREEN SKILLS

Skill	Percentage
Recycling/waste reduction	78%
Sustainable transportation	71%
Water conservation	70%
Sustainable design	65%
Eco-friendly consumer habits	65%
Energy conservation	61%
Sustainable energy	59%
Climate change	58%
Environmental policy	54%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 202; N=900 secondary school students.

GENERATIVE AI IS A KEY SKILL FOR FUTURE JOBS AND HAS THE POTENTIAL TO DISRUPT EDUCATION

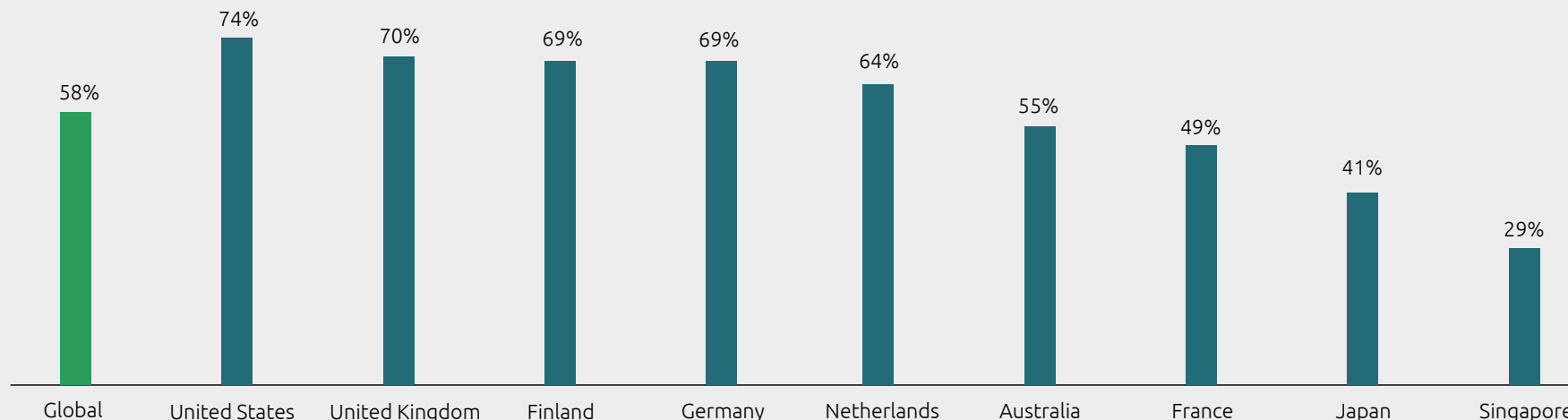## Many teachers believe AI will be a key skill for future jobs

According to the latest future of jobs report from the World Economic Forum, AI and machine learning specialists top the list of fast-growing jobs and are expected to grow by 40%, or 1 million jobs, through 2027.[13] AI and machine learning specialists will need to be skilled in interacting with AI systems as the usage of AI drives continued industry transformation. Our research revealed most teachers hold a similar view. Nearly 60% of secondary school teachers globally believe interacting with artificial intelligence (AI) systems will be a skill required for jobs in the future. High school teachers are more likely to agree that AI will be a key skill (62% versus 46% of middle school teachers). This view also differs by country, with only 29% of teachers in Singapore agreeing compared to 74% of US teachers (see Figure 18).

Figure.18

Almost 60% of teachers globally believe that interacting with AI will be a key skill for jobs in the future

PERCENTAGE OF TEACHERS WHO AGREE WITH THE STATEMENT:
INTERACTING WITH, AND GETTING WORK DONE BY, AN AI WILL BE A KEY SKILL FOR JOBS OF THE FUTURE

Global 58%
United States 74%
United Kingdom 70%
Finland 69%
Germany 69%
Netherlands 64%
Australia 55%
France 49%
Japan 41%
Singapore 29%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,800 secondary school teachers.

A majority of teachers have experimented with ChatGPT

According to our survey:

- Globally, 61% of teachers say they have used ChatGPT for professional reasons (ranging from 70% of teachers in the US to 52% of teachers in Singapore and the Netherlands).

- Male teachers are more likely (71%) to have used ChatGPT than female teachers (59%).

- Teachers working in urban (62%) or suburban (63%) areas are more likely to have used ChatGPT than teachers in rural areas (48%).

- Teachers working in disadvantaged communities are more likely (74%) to have used ChatGPT than teachers working in wealthy (65%) and middle-class (55%) communities.

Teachers who have used ChatGPT are generally curious about it (49%). Over one-third (37%) of teachers who have used ChatGPT say they are excited about the technology.

Some schools currently prohibit or restrict ChatGPT while others accommodate the technology

Globally, 48% of teachers say their school has blocked or restricted the use of ChatGPT in one form or another, for example, by prohibiting the use of ChatGPT for classroom and homework assignments, or by restricting access to or outright blocking ChatGPT on school networks and school-owned devices. By country, 32% of teachers in Singapore say their school has blocked ChatGPT on school networks and school-owned devices, followed by 26% of teachers in France and the US. Only 6% of teachers in Finland and 14% in the Netherlands say the same. Given the expected growth in jobs requiring AI skills, the question remains whether it is the right move for schools to outright block AI, or rather figure out how to work best with the technology.

Around one-fifth (19%) of teachers say their school allows ChatGPT to be used for certain assignments but not others (e.g., using it to create an outline for an essay but then writing longhand), and 18% say their school is currently evaluating the tool for its applicability and usefulness in the classroom.

Chris Mah, educator and academic at the Stanford Graduate School of Education says: *"Many people feel 'icky' when a machine does something, but not as 'icky' if a human was doing the same thing. There is a human analogy for many of the things ChatGPT can do. For example, educators might be upset that a machine is going to help students with editing, punctuation, and grammar, but that same educator would not have a problem if the student hired and paid a personal tutor to do the exact same thing. There will need to be AI education and literacy around the tool for both teachers and students. They will need to have a shared understanding of what is and is not cheating, and how to use the tool in a way that does not compromise learning."*

Teachers are worried about the impact of ChatGPT on learning, but many can still see its potential

The majority (78%) of secondary school teachers in our survey say they are worried about the negative impact of ChatGPT on student learning outcomes (ranging from 67% in Germany to 93% in Singapore). Examples of worries teachers shared include:

- that the value of writing as a skill will diminish because of AI tools like ChatGPT (66% overall, ranging from 42% in Germany to 80% in Singapore);
- that ChatGPT will limit the creativity of students (66% overall, ranging from 46% in Germany to 84% in Singapore).

Stanford's Chris Mah thinks differently: *"Many standardized test prompts are problematic; they conflate writing ability with background knowledge, reading comprehension, and time management. ChatGPT can do these tasks well and so I hope it makes educators rethink*

the way we approach standardized writing. More necessary skills involve prompt engineering; for example, how do you prompt the machine to give you the output you want? This requires metacognitive skills including identifying the relevant pieces of information, the tone you want it to adopt, and the audience you want it to write for."
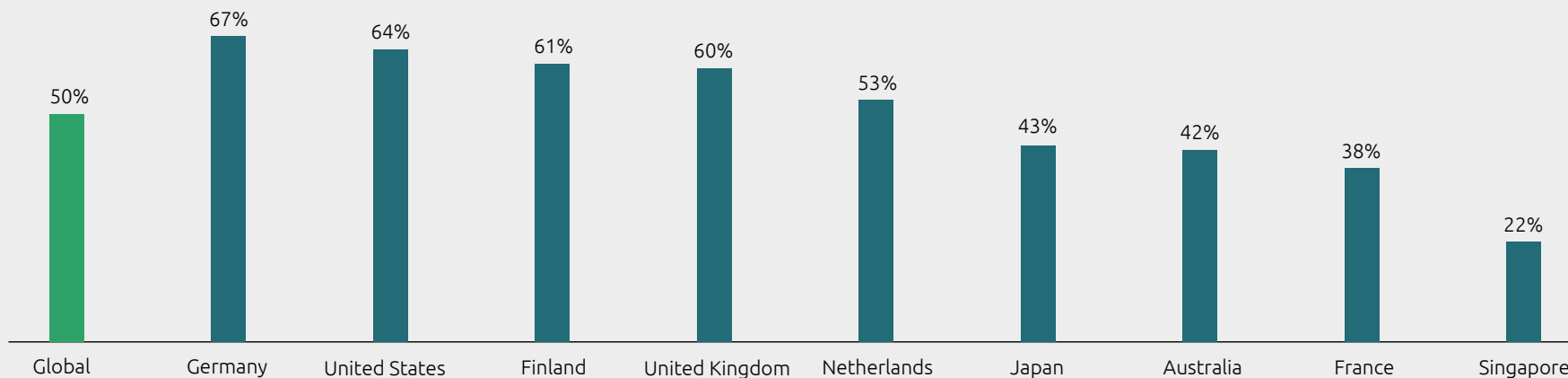
Half of secondary school teachers globally say that the potential of ChatGPT as an educational tool outweighs its risks. The share of teachers agreeing with this sentiment ranges from 22%

in Singapore to 67% in Germany (see Figure 19). Stanford's Chris Mah is positive: *"Generative AI systems like ChatGPT have the potential to narrow the opportunity gap in education. These tools are simple to use and free right now. You just need a device and a connection. The most optimistic scenario is a future where every teacher has a virtual teaching assistant (TA), and every student has a virtual tutor. While there are risks and pitfalls along the journey, I can envision a world, in a few short years, where something like this can be reality."*

Figure.19

Half of teachers globally say ChatGPT's potential in education outweighs its risks

PERCENTAGE OF TEACHERS WHO AGREE WITH THE STATEMENT: THE POTENTIAL OF CHATGPT AS AN EDUCATIONAL TOOL OUTWEIGHS ITS RISKS

Global	Germany	United States	Finland	United Kingdom	Netherlands	Japan	Australia	France	Singapore
50%	67%	64%	61%	60%	53%	43%	42%	38%	22%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,800 secondary school teachers.

Capgemini Research Institute 2023

"Generative AI systems like ChatGPT have the potential to narrow the opportunity gap in education. These tools are simple to use and free right now. You just need a device and a connection. The most optimistic scenario is a future where every teacher has a virtual teaching assistant (TA), and every student has a virtual tutor. While there are risks and pitfalls along the journey, I can envision a world, in a few short years, where something like this can be reality."

Chris Mah

Educator and academic,
Stanford Graduate School
of Education

Teachers see the most benefit in using ChatGPT to teach students how to interact with an AI model

Regardless of whether a teacher has used ChatGPT already, over half of all teachers say they could benefit from six of the ten use cases analyzed in our research. Given that 57% of teachers agree that schools need to adapt to prepare students for a future filled with all kinds of AI tools, an almost equal share of teachers (60%) see value in using ChatGPT as a way to teach students how to interact with AI models (see Figure 20).

Figure.20

Over half of teachers globally see benefit in six of the ten ChatGPT use cases analyzed

PERCENTAGE OF TEACHERS WHO FIND THE CHATGPT USE CASES BENEFICIAL

The OECD's Andreas Schleicher says: *"When you ask teachers, why they became a teacher, the answer is not often about teaching quadratic equations, but rather it is about supporting and developing young people in their life and in careers. This is what is now possible. A teacher can now focus much more time on the human, social, relational work that teachers take tremendous pride in and worry less about delivery of instruction, because they can rely on smart technology for that. I think teachers will be bigger beneficiaries than students from this evolution, and those teachers that are ready to adapt, will have much more interesting work."*

Use case	%
Use it to teach how to interact with/understand AI models	60%
Use it as a critical-thinking exercise (e.g., identify when its answers to factual questions are wrong)	56%
Generate ideas for classroom materials (e.g., conceptual examples, writing examples, quiz questions)	55%
Suggest edits to students' work	52%
Support personalized activities for different types of students (e.g., a visual-spatial learner, a neurodivergent student)	51%
Use it as a tool for student writing (e.g., brainstorm topics, generate an outline)	51%
Differentiate or translate text (e.g., modify texts for different levels of reading fluency and languages)	46%
Serve as a debate partner	43%
Help communicate with families (e.g., generate phrasing for email updates, newsletters)	43%
Act as a tutor	34%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,800 secondary school teachers.

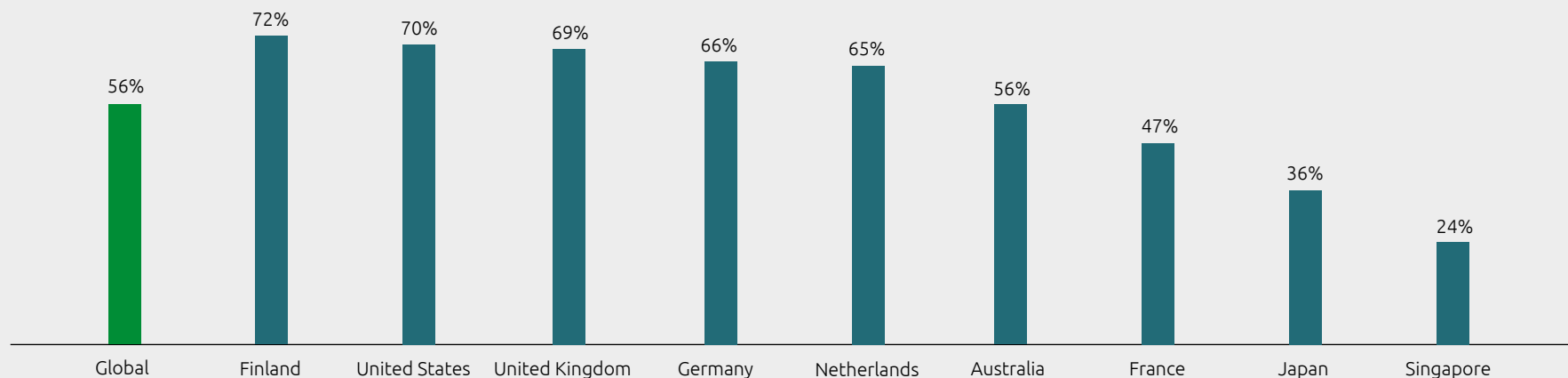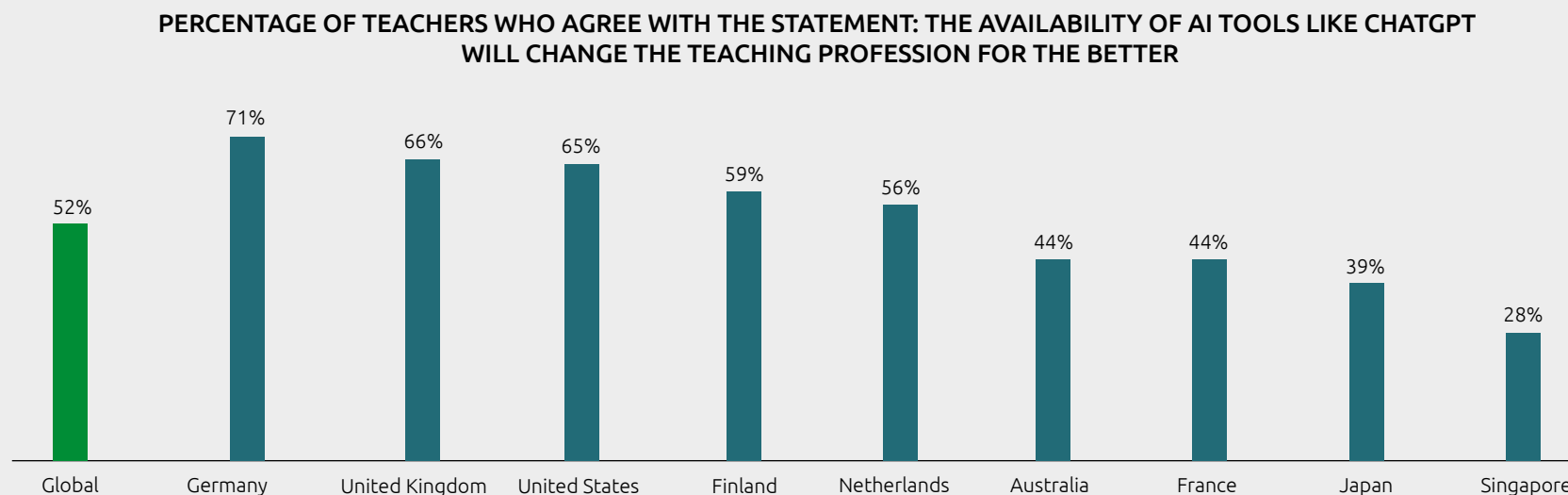## Teachers believe schools must adapt to AI

Over half (56%) of secondary school teachers globally in our survey believe curriculum and assessments should be adapted to account for student use of AI-generated content. This rises to 72% in Finland and declines to 24% in Singapore (see Figure 21). The OECD's Andreas

Schleicher says: *"Generative AI will liberate the teaching profession. Creating content is a very resource-intensive and time-consuming responsibility of teachers. These technologies can give them time back to focus on more direct student support."*

Figure.21

Over half of teachers globally believe education needs to be adapted to account for AI

PERCENTAGE OF TEACHERS WHO AGREE WITH THE STATEMENT: CURRICULUM AND ASSESSMENTS SHOULD BE ADAPTED TO ACCOUNT FOR STUDENT USE OF AI-GENERATED CONTENT

Global	Finland	United States	United Kingdom	Germany	Netherlands	Australia	France	Japan	Singapore
56%	72%	70%	69%	66%	65%	56%	47%	36%	24%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,800 secondary school teachers.

Globally, 52% of secondary school teachers in our survey believe AI tools like ChatGPT will change the teaching profession for the better. This rises to 71% in Germany and declines to 28% in Singapore (see Figure 22). Stanford's

Chris Mah explains: *"ChatGPT can be used to amplify what teachers are doing. It can be used to support teaching and learning and can also be used by administrators to automate tasks that are currently time consuming."* Nadi Albino, deputy director of partnerships at UNICEF, says: *"The process for developing curriculum and pedagogy is long and*

laborious. Oftentimes it is outdated even if just released. Curriculum cannot be static. Decision-makers in governments (e.g., ministries or departments of education, finance) need to understand we live in an evolving world, and work with the private sector and youth to drive change in curriculum and pedagogy more quickly."

Figure.22

More than half of teachers globally agree that AI will change the teaching profession for the better

PERCENTAGE OF TEACHERS WHO AGREE WITH THE STATEMENT: THE AVAILABILITY OF AI TOOLS LIKE CHATGPT WILL CHANGE THE TEACHING PROFESSION FOR THE BETTER
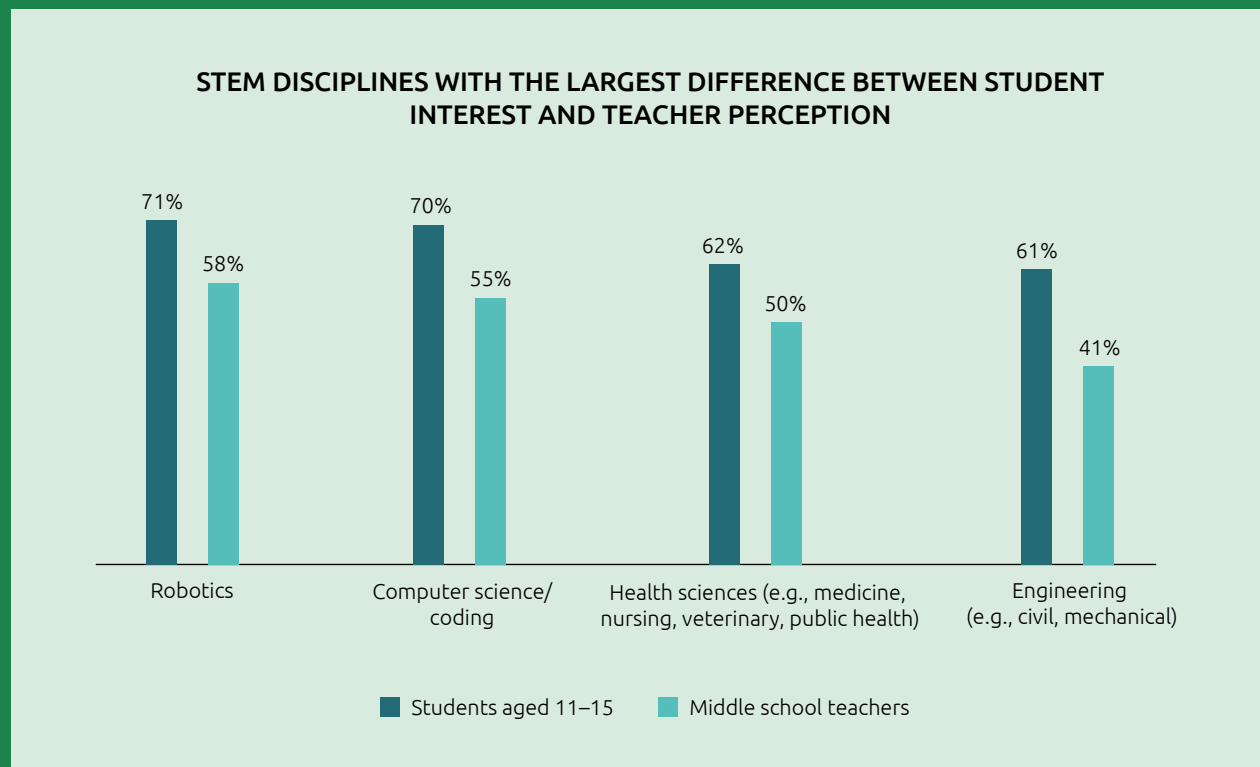

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=1,800 secondary school teachers.

Secondary student interest in science, technology, engineering, and math (STEM)

Robotics and computer science/coding are the top two STEM disciplines of interest to students

Among all secondary school students in our survey, 72% say they are interested in learning about robotics, and 69% are interested in learning about computer science/coding (see Figure 23). Our research did not reveal major differences by gender, suggesting that male and female students might begin their academic experience with similar interest levels. That interest, however, needs to be nurtured and converted to a potential career path along their educational journey. This is supported by research showing that girls' and young women's achievements in mathematics and science are on a par with those of boys and young men.[14] Yet women remain underrepresented in the STEM workforce. For example, in the US, women comprise nearly half the total workforce, but only 27% of the STEM workforce.[15] UNICEF's Nadi Albino says: *"The gender divide in STEM is changing but it is just not changing fast enough. Pedagogy and how a teacher is trained as well as cultural and social contexts drive this gap. In certain quarters of the world, boys and men are perceived as smarter than girls and women, and science is for men and the arts is for women. Many educators also inaccurately believe that boys outperform girls in STEM subjects and therefore do not give girls the opportunities they need or desire. These misperceptions contribute to the divide."*

Figure.23

Almost three-quarters of students are interested in robotics

PERCENTAGE OF SECONDARY SCHOOL STUDENTS INTERESTED IN STEM DISCIPLINES

Discipline	Percentage
Robotics	72%
Computer science/coding	69%
Environmental science/natural resources	65%
Biological science (e.g., botany, physiology, zoology)	61%
Mathematics and statistics	61%
Health sciences (e.g., medicine, nursing, veterinary, public health)	61%
Engineering (e.g., civil, mechanical)	61%
Physical science (e.g., astronomy, chemistry, physics)	59%
Psychology	49%

Source: Capgemini Research Institute, Digital skills anad technology in secondary education survey, March–April 2023; N=900 secondary school students.

72%

of students aged 11–18 they are interested in learning about robotics, and 69% are interested in learning about computer science/coding

Figure.24

Middle school teachers do not realize the extent to which their students are interested in certain STEM disciplines

We found differences between the interest levels expressed in STEM disciplines by students aged 11–15 and the perception of their STEM interest levels by their teachers. For example, 61% of students aged 11–15 say they are interested in engineering, but only 41% of middle school teachers believe students to be interested (see Figure 24). This finding suggests that middle school teachers might be missing an opportunity to incorporate STEM activities into their curriculum, given their impression of the lower interest levels of their students, and thus are not nurturing that interest fully to help convert it to more advanced study.

STEM DISCIPLINES WITH THE LARGEST DIFFERENCE BETWEEN STUDENT INTEREST AND TEACHER PERCEPTION

Source: Capgemini Research Institute, Digital skills anad technology in secondary education survey, March–April 2023; N=464 secondary school students aged 11–15; N=493 middle school teachers.

Andreas Schleicher

Director for Education and
Skills and Special Advisor
on Education Policy to the
Secretary-General at the
Organization for Economic
Co-operation and Development
(OECD)

The Capgemini Research Institute spoke with Andreas Schleicher, a mathematician, statistician, and researcher in the education field. He is the director for education and skills at the OECD, where he leads the Programme for International Student Assessment (PISA). Our discussion explored trends in digital literacy education and the key skills students must master for the 21st-century digital world.

What does digital literacy mean to you?

"The technological skills are easy to learn, and the technological barriers will diminish. What will become ever more important is understanding the nature of the technologies, so you know how to interact with them. This is what digital literacy is about – our capacity to reconcile and manage tensions and dilemmas, mobilize cognitive, social, and emotional perspectives, and navigate ambiguity. Those are the foundations of living in the digital world, and they are actually not easy to teach as they involve a lot of experience."

Is digital literacy adequately incorporated into secondary education today?

"We often take a 20th- or even 19th-century approach to learning. Literacy is a great example. We teach students to extract knowledge from prefabricated texts, valuing repetition and memorization. We do not teach students to question the established wisdom of our times, to think around the next corner, to triangulate different information sources. That is what digital literacy is about. Can you distinguish fact from opinion?

If you teach students that what they read in schoolbooks is always correct, and that they should remember it for their entire lives, then how will they deal with alternative texts and competing answers on Google or ChatGPT? This is the phenomenon we have today; we have created a mindset that deals with fixed information. Today's reality is about creating knowledge, not extracting knowledge. Much of what we learn in school is the accumulation of subject matter content, and not deep understanding of ideas and concepts that a young person needs to navigate the digital world and, in particular, to navigate ambiguity to solve complex problems."

How can our educational systems be modernized to impart digital skills?

"For me, the answer is surprisingly simple – it is about teaching fewer things at much greater depth. For example, science is always going to be very important. A student, however, does not need to know all the surface knowledge on physics and chemistry and biology. But they do need to be able to think like a scientist, for example, to distinguish questions that are scientifically investigable from those that are not, or design and conduct an experiment.

The same goes for history. You do not need to remember names and places because you can look them up, but a student needs to be able to think like a historian, understand how societies emerge, how they develop and advance, and even how they unravel. Therefore, the accumulation of surface content becomes less and less relevant. This of course is a much tougher ask of teachers who are designing learning environments. Yesterday's role of a teacher is an instructor, and tomorrow, teachers need to be a great coach, a great mentor, a great facilitator, a great evaluator, and a great social worker."

RECOMMENDATIONS:
HOW SECONDARY SCHOOL
STUDENTS CAN BE BETTER
PREPARED WITH DIGITAL SKILLS

Significant investment and action have been mobilized in recent years from society and from corporations to mitigate the digital skills gap. Wide ranging efforts from governments, NGOs, and businesses are ongoing:

- The EU invests in multiple initiatives bringing together member states, companies, social partners, non-profits, and education providers to address the lack of digital skills in Europe, including the European Skills Agenda, the Digital Education Action Plan, and the Digital Skills and Jobs Coalition.[16]

- In 2022, the UK government unveiled a new digital strategy to grow the digital economy and address tech sector skills.[17]

- In partnership with 350 organizations, the World Economic Forum launched its Reskilling Revolution in 2020 with the goal of providing one billion people with better education, skills, and economic opportunities by 2023.[18]

- US-based global non-profit Digital Promise partners with educators, researchers, tech leaders, and communities to expand access to digital technologies and close the digital skills gap at all education levels.[19]

- IBM, through their education program, Skills Build, helps underrepresented communities among high school and university students develop skills in key digital technologies such as AI and cloud, and other professional skills.[20]

- Microsoft operates Showcase Schools, a global community of over 1,000 primary and secondary schools across 70 countries using digital transformation to create immersive, inclusive experiences for students.[21]

- Google launched a micro-credential program in Australia to train people in digital skills in high demand in six months or less. The company offers 10,000 free scholarships for underrepresented groups.[22]

From our research and discussions with leading education experts, we recommend that state and local governments and educators consider the actions outlined below to further support secondary school students in attaining the digital skills they need for today's and tomorrow's workforce.

82%

of teachers we surveyed agreed that compulsory education in digital skills and making the subject mandatory would be to the benefit of students.

Mandate digital and media literacy as an educational requirement

In the US, there is no national digital or media literacy education law for primary and secondary education (i.e., kindergarten through grade 12 schools). Only a few states (Illinois and New Jersey) have passed legislation requiring the teaching of media literacy. From the 2022/23 school year, high school students in Illinois are taught how to access, analyze, and evaluate media messages. New Jersey's 2023 law requires all K-12 students at public schools to receive digital literacy.[23] Another four US states have policy endorsing media literacy written into their education standards.[24] Federal/state governments can work to pass legislation requiring digital and media literacy be taught to secondary school students, and educators can help by advocating for this change. Globally, 82% of teachers we surveyed agreed that compulsory education in digital skills and making the subject mandatory would be to the benefit of students. UNICEF's Nadi Albino believes curriculum reforms are

vital: *"It is very important that governments ensure digital skills are part and parcel of school curriculums. Teachers need to be better equipped and trained to use technology as well as teach the digital skills required in the private and public sectors."*

Finland is a global leader in digital literacy in secondary education. In the 2016/17 school year, Finland reformed its national core curriculum embedding digital literacy across all seven core competence areas, shifting from a focus on learning objectives within single subjects to broader, interdisciplinary competencies.[25]

Share and mobilize knowledge on digital skills

The sharing of knowledge and best practices among teachers and educators within the same school, district, state, or country could be improved and enhanced to benefit student learning. The OECD's Andreas Schleicher sees sharing and mobilizing knowledge as a trait of high-performing school systems: *"In a high-performing system,*

what one teacher knows, every teacher will know. However, in most systems today, there is a very atomistic culture, where a teacher knows virtually nothing from a neighboring teacher. There is no lateral flow of information and sharing of best practices. Knowledge only travels vertically, trickling down from the state or local government. If you have an incredibly creative teacher, the system will not benefit from that experience. The US is a good example of information moving vertically, and this is where so much value gets lost. I do not believe this approach is working in our current times."

In Singapore, knowledge-sharing is rewarded. Teachers in Singapore regularly observe each other's classes and exchange best practices. They are entitled to 100 hours of in-service professional development each year to adapt to the country's changing needs and their annual performance appraisal and bonus opportunity consider not only contributions to student development, but also their collaboration with parents and their contributions to their colleagues.[26,27] In 2010, Singapore established the Academy of Singapore Teachers, a center of excellence to spearhead professional development and encourage continuous sharing of best practices.[28]

Encourage corporations to be part of the learning ecosystem

Today's complex digital world requires students to be well versed across interdisciplinary subjects and to employ a multitude of soft and hard skills. Businesses can support students by becoming more involved in the learning ecosystem and sharing their view of the future digital world and future jobs. This could be through partnering with local schools and offering practical experiences, hands-on learning opportunities, or career mentorship programs. The relationship between work and learning is critical today, says the OECD's Andreas Schleicher: *"Good places of work are going to be great places of learning, and good places of learning should always anticipate the future of work. Business should be part of the learning ecosystem now. Starting very early on, they can give young people a better understanding of what that future will look like. At the moment, you cannot be what you cannot see. Teachers are not naturally good at explaining what jobs could look like in the future."*

American wireless network operator Verizon has a goal of training over 10 million youth in digital skills by 2030 and, through its Verizon Innovative Learning program, already provides free internet access, technology-infused lessons, and teacher training to participating schools.[29]

Engage parents in meaningful ways to support digital skills learning

As digital technologies become a near-constant presence in the lives of young children, parents must discuss the importance of staying safe online and nurture digital literacy skills in their children. Educators and parents can collaborate to ensure the skills students learn in school are reinforced at home and vice versa. *"Parents are a big part of the equation. Parents can be more than just customers; they can be a part of the learning ecosystem supporting students in their acquisition of digital skills,"* says Andreas Schleicher of the OECD. For example, parents and educators should openly discuss with students how to recognize and deal with cyberbullying, the risks of sharing personal information online, how to spot online scams, and how to evaluate online sources for misinformation or bias. Direct engagement and support from parents can help children improve their digital skills and take part in a wider range of online activities, while reducing exposure to risks.[30]
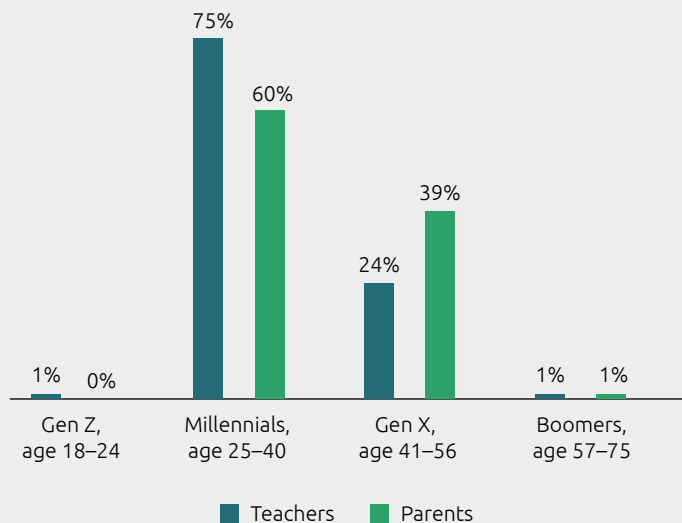
CONCLUSION

Young people must master many skills if they are to thrive in today's and tomorrow's digital world: from being adaptable, creative, and empathetic to deciphering fact from fiction and identifying misinformation and bias online. Our research revealed, however, that many secondary school students – particularly those from rural areas – do not have the digital skills necessary to succeed in the workplace, and many schools and teachers do not prioritize digital skills education. With the rapid pace of technological change especially with AI, governments and educational systems around the world need to do more to prepare their students for success in the digital world. With corporations continuing to play a pivotal role in partnering with schools, non-profits, and NGOs to upskill and train youth as well as their own workforce, filling this gap is a formidable goal that can indeed be accomplished.

RESEARCH METHODOLOGY

We surveyed 1,800 secondary school teachers, 4,500 parents of secondary school students, and 900 students aged 11–18 across North America, Europe, and Asia-Pacific. All teachers surveyed work full time and are employed in a public or state secondary school. Parents surveyed within each country are representative of the country's national population for race/ethnicity/ethnic group and household income. All students aged 18 and under were surveyed with the consent of a responding parent. The global survey took place in March and April 2023. The demographic details of respondents are below.

The study findings reflect the views of the respondents to our online questionnaire for this research and are aimed at providing directional guidance. Please contact one of the Capgemini experts listed at the end of the report to discuss specific implications.
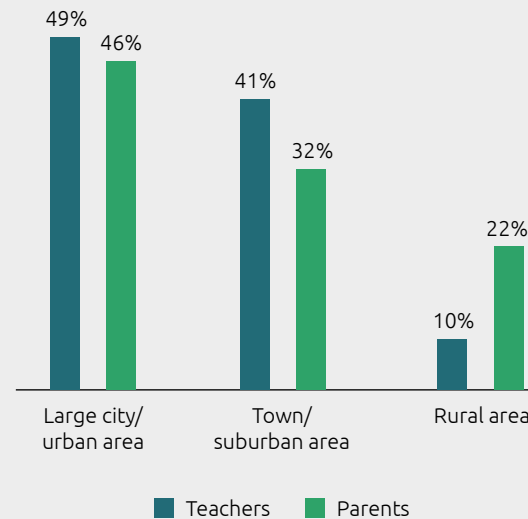
TEACHERS AND PARENTS BY AGE GROUP

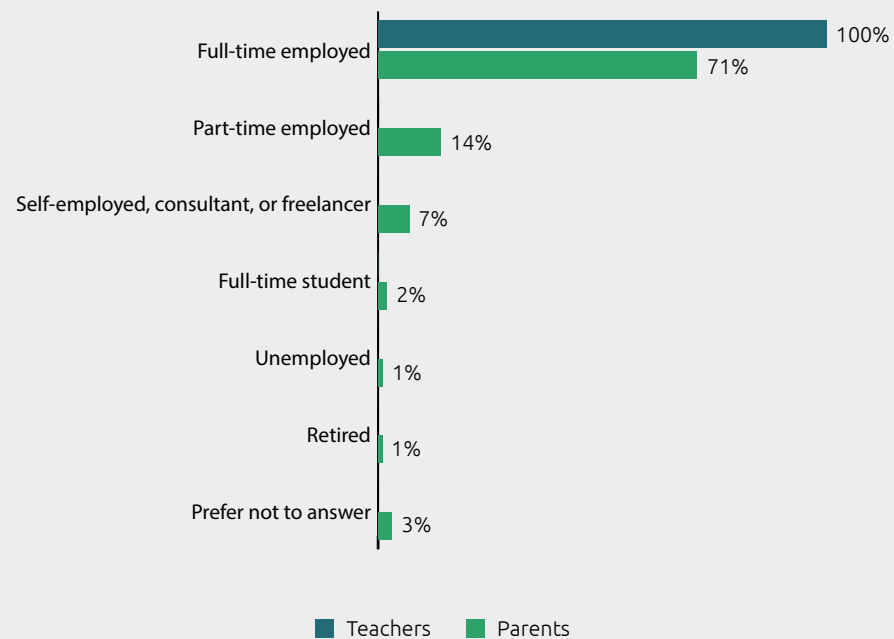| Age Group	Teachers	Parents
Gen Z, age 18–24	1%	0%
Millennials, age 25–40	75%	60%
Gen X, age 41–56	24%	39%
Boomers, age 57–75	1%	1%

SECONDARY SCHOOL STUDENTS BY AGE

Age	Students
11	14%
12	11%
13	13%
14	14%
15	15%
16	12%
17	11%
18	10%
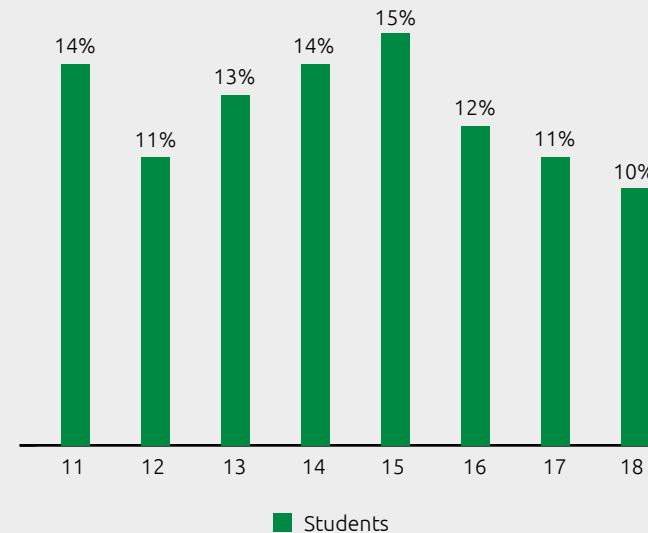
TEACHERS, PARENTS, AND STUDENTS BY SELF-IDENTIFIED GENDER

- Teachers
- Parents
- Students
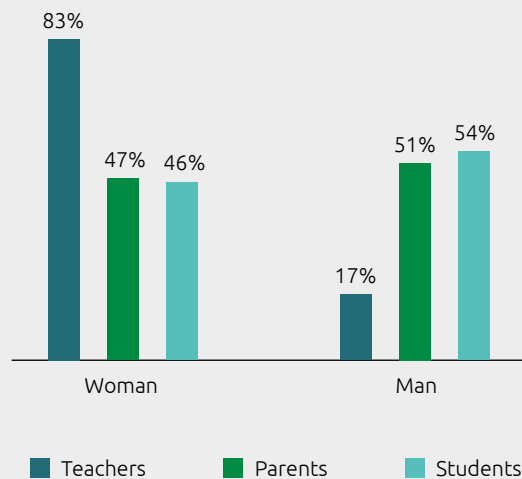
TEACHERS AND PARENTS BY AREA THEY TEACH OR AREA THEY LIVE

- Teachers
- Parents

TEACHERS AND PARENTS BY EMPLOYMENT STATUS

Full-time employed — 100% (Teachers), 71% (Parents)
Part-time employed — 14%
Self-employed, consultant, or freelancer — 7%
Full-time student — 2%
Unemployed — 1%
Retired — 1%
Prefer not to answer — 3%

■ Teachers ■ Parents

TEACHERS AND PARENTS BY EDUCATIONAL ATAINMENT

Doctoral or professional degree (e.g., PhD, EdD, MD, JD/LLD) — 9% (Teachers), 14% (Parents)
Post-graduate degree (e.g., MA, M. Tech, MBA) — 51%, 34%
Undergraduate degree (e.g., BSc, Tech) — 40%, 28%
High school/secondary school — 19%
Primary school — 2%
Other — 2%
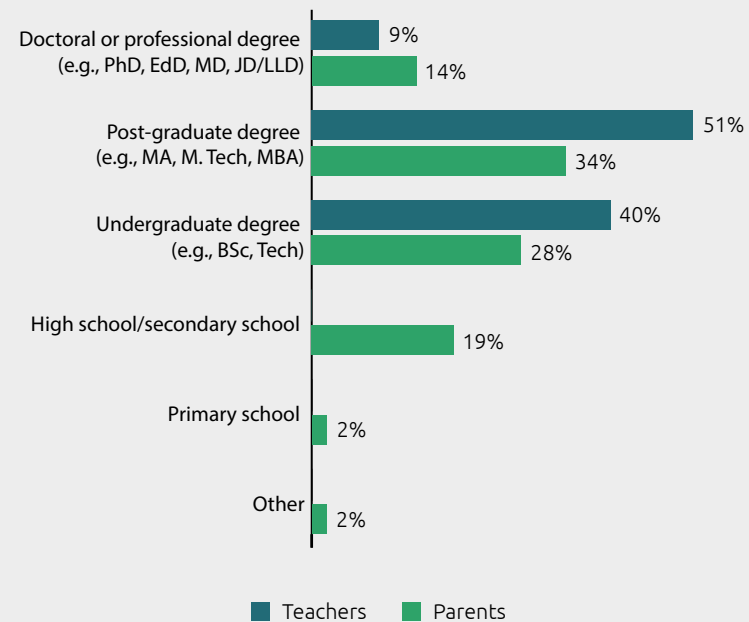
■ Teachers ■ Parents

TEACHERS BY NUMBER OF YEARS OF TEACHING EXPERIENCE

34%

25%   25%

10%

2%   3%

Less than   2–5   6–10   11–15   16–20   More than
2 years   years   years   years   years   20 years
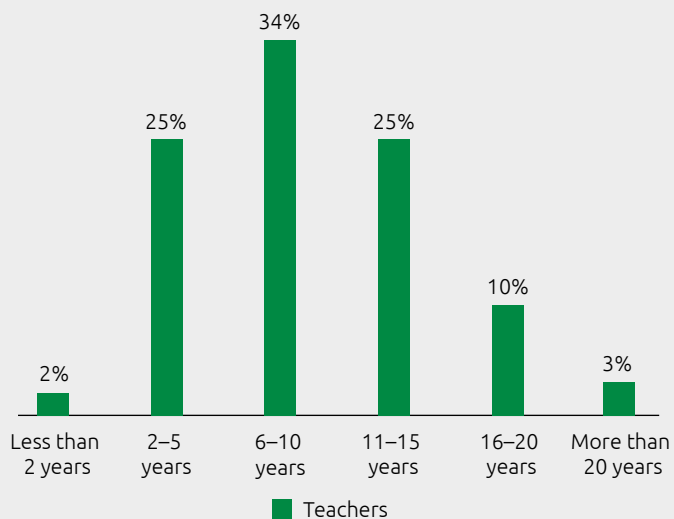
■ Teachers

TEACHERS BY ROLE IN CLASSROOM

57%

43%

Lead classroom teacher   Assistant classroom teacher

■ Teachers

TEACHERS AND PARENTS BY COUNTRY OF RESIDENCE
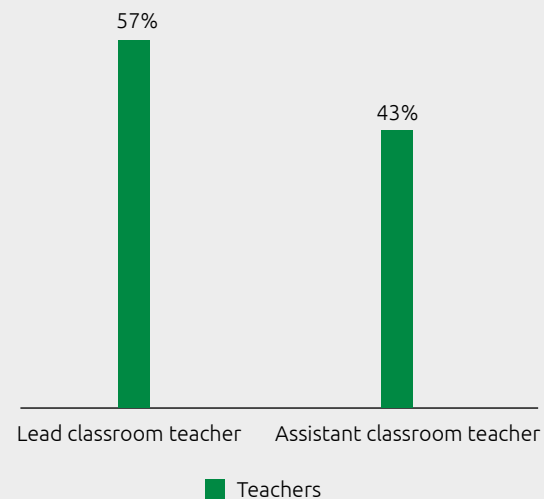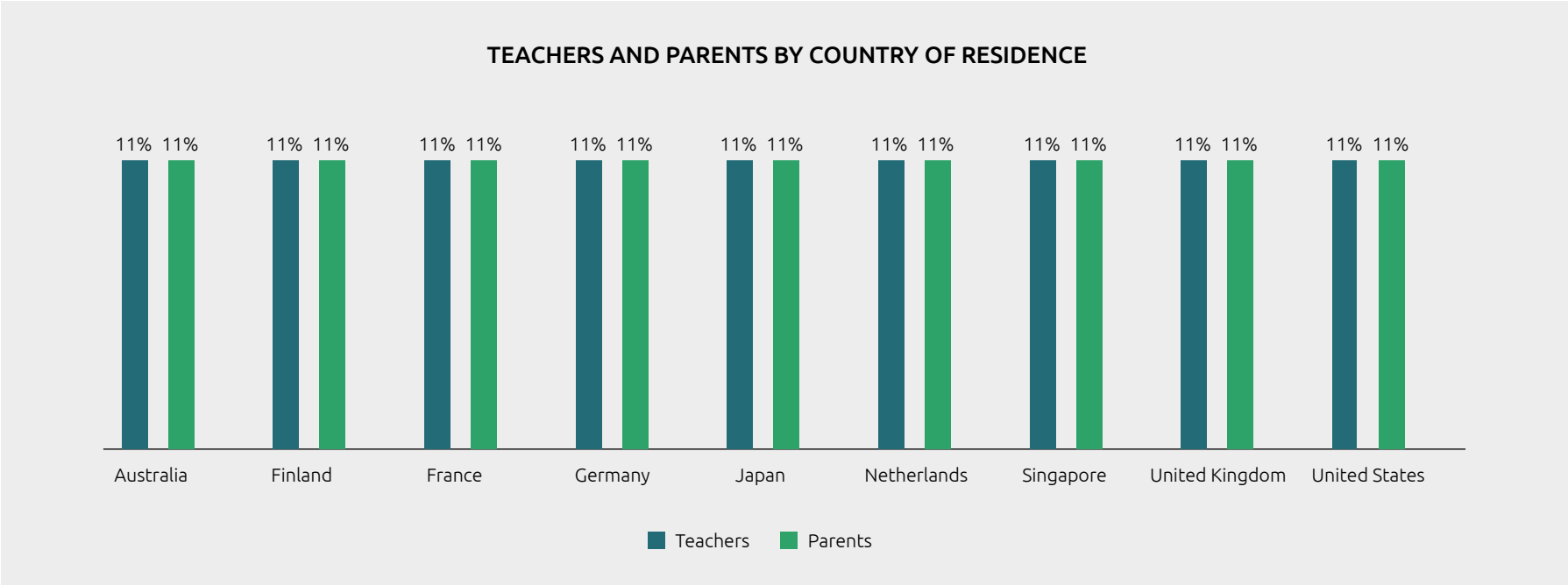
Annual household income of parents by country (N=500 parents per country)

Australia	%
Less than $12,000	11%
$12,000–less than $36,000	26%
$36,000–less than $60,000	32%
$60,000–less than $80,000	21%
$80,000 or more	10%

Finland	%
Less than €5,000	3%
€5,000–less than €20,000	14%
€20,000–less than €50,000	23%
€50,000–less than €70,000	37%
€70,000 or more	24%

France	%
Less than €5,000	4%
€50,00–less than €20,000	18%
€20,000–less than €50,000	37%
€50,000–less than €70,000	21%
€70,000 or more	19%

Germany	%
Less than €6,000	3%
€6,000–less than €30,000	13%
€30,000–less than €60,000	43%
€60,000–less than €80,000	20%
€80,000 or more	20%

Japan	%
Less than ¥1,999,999	13%
¥2,000,000–¥3,999,999	21%
¥4,000,000–¥6,999,999	30%
¥7,000,000–¥9,999,999	20%
¥10,000,000 or more	16%

Netherlands	%
Less than €5,000	4%
€5,000–less than €20,000	20%
€20,000–less than €50,000	48%
€50,000–less than €70,000	17%
€70,000 or more	12%

Singapore	%
Under $15,000	7%
$15,000–$49,999	16%
$50,000–$99,999	30%
$100,000–$199,999	30%
$200,000 or more	18%

UK	%
Less than £15,000	5%
£15,000–£29,999	18%
£30,000–£44,999	25%
£45,000–£59,999	23%
£60,000 or more	28%

US	%
Under $15,000	7%
$15,000–$49,999	26%
$50,000–$99,999	32%
$100,000–$199,999	23%
$200,000 and over	12%

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=4,500 parents, N=1,800 secondary school teachers, N=900 secondary school students.

APPENDIX

Digital skills included in our survey

Computer/digital fundamentals

1. Using computer applications (e.g., Microsoft Word, Google Drive).
2. Finding information online using websites such as Google, Bing, Yahoo!
3. Typing/keyboarding (i.e., touch-typing on a physical keyboard, not a mobile or tablet screen).

Digital problem-solving/media literacy

4. Understanding trustworthy online sources from which to gather information.
5. Knowing whether information online is biased.
6. Distinguishing between fact and opinion online.
7. Using online information properly (e.g., not copying or plagiarizing, citing sources).
8. Knowing when online content is advertising.

Safety and responsibility/digital citizenship

9. Understanding the importance of protecting/updating passwords.
10. Managing privacy settings online.
11. Recognizing a phishing or spam email.
12. Understanding the risks of posting and commenting online (e.g., sharing personal information about yourself or friends/family).
13. Understanding how to stop cyberbullying (e.g., not responding/retaliating, blocking, reporting).
14. Knowing when something online needs to be reported to the appropriate "authorities" (e.g., bullying or violent threat to teacher, parent, or police).

Digital communication/data literacy

15. Knowing how to write a professional email (i.e., tone and voice, clarity of message, word choice, structure, grammar).
16. Knowing how to use different forms of online communication (e.g., emails, messaging, discussion boards).
17. Making charts from data using tools such as Microsoft Excel or Google Sheets.
18. Creating a presentation using charts and text (e.g., Microsoft PowerPoint, Google Slides).

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=4,500 parents of secondary school students, N=1,800 secondary school teachers, N=900 secondary school students.

Definitions of soft skills included in our survey

1. **Communication:** communicating effectively with others, both verbally and in writing.

2. **Listening:** listening actively and attentively to others when they are speaking to you.

3. **Critical thinking:** analyzing and evaluating information, making informed decisions, and problem-solving.

4. **Time management:** managing your time effectively and balancing your academic work and extracurricular activities.

5. **Collaboration:** working effectively in groups and contributing positively to team projects.

6. **Leadership:** taking initiative, motivating others, and leading by example.

7. **Adaptability:** adapting to changes and new situations, being open to feedback, and being willing to learn.

8. **Emotional intelligence:** understanding and managing your own emotions.

9. **Empathy:** understanding and sharing the feelings of another person.

10. **Creativity:** thinking creatively and coming up with innovative solutions.

11. **Conflict resolution:** resolving conflicts in a constructive and positive way.

12. **Critical ignoring:** choosing what information is most important, what information to ignore, and where to invest limited time and attention.

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=4,500 parents of secondary school students, N=1,800 secondary school teachers, N=900 secondary school students.

Definitions of green skills included in our survey

1. **Recycling/waste reduction:** understanding the importance of recycling, how to dispose of different types of waste (e.g., paper, plastic), and how to reduce waste (e.g., composting, using reusable containers).

2. **Energy conservation:** understanding how to conserve energy by turning off lights and electronics when not in use and using natural light whenever possible.

3. **Water conservation:** understanding the importance of conserving water and how to reduce water usage (e.g., fixing leaks, taking shorter showers).

4. **Sustainable transportation:** understanding sustainable transportation options, such as walking, biking, or public transportation, instead of driving alone in a car.

5. **Eco-friendly consumer habits:** understanding the environmental impact of purchasing decisions and how to make sustainable choices, such as buying products with minimal packaging or made from recycled materials.

6. **Sustainable energy:** understanding renewable energy sources, such as solar, wind, and geothermal energy.

7. **Climate change:** understanding the causes and impacts of climate change and how to take action to reduce greenhouse gas emissions (e.g., reducing energy usage, driving less)

8. **Environmental policy:** understanding the basics of environmental laws and policies that promote sustainability.

9. **Sustainable design:** understanding how sustainability is incorporated into the design principles of buildings and products.

Secondary school grades/levels included in our survey by country

Australia		Germany		Singapore	
	Year 7 Year 8 Year 9 Year 10 Year 11 Year 12		Grade 6 (Hauptschule or Realschule or Gesamtschule or Gymnasium) Grade 7 (Hauptschule or Realschule or Gesamtschule or Gymnasium) Grade 8 (Hauptschule or Realschule or Gesamtschule or Gymnasium) Grade 9 (Hauptschule or Realschule or Gesamtschule or Gymnasium) Grade 10 (Hauptschule or Realschule or Gesamtschule or Gymnasium) Grade 11 (Gesamtschule or Gymnasium) Grade 12 (Gesamtschule or Gymnasium) Grade 13 (Gesamtschule or Gymnasium)		Secondary 1 Secondary 2 Secondary 3 Secondary 4 Secondary 5
Finland		Japan		United Kingdom	
	Lower secondary: Grade 7 Lower secondary: Grade 8 Lower secondary: Grade 9 High school: Grade 1 High school: Grade 2 High school: Grade 3		Year 7 Year 8 Year 9 Year 10 Year 11 Year 12		Year 7 Year 8 Year 9 Year 10 Year 11 Year 12 Year 13
France		Netherlands		United States	
	Sixième Cinquième Quatrième Troisième Seconde Première Terminale		Grade 6 (VMBO or HAVO or VWO) Grade 7 (VMBO or HAVO or VWO)w Grade 8 (VMBO or HAVO or VWO) Grade 9 (VMBO or HAVO or VWO) Grade 10 (HAVO or VWO) Grade 11 (VWO)		Grade 6 Grade 7 Grade 8 Grade 9 Grade 10 Grade 11 Grade 12

Source: Capgemini Research Institute, Digital skills and technology in secondary education survey, March–April 2023; N=4,500 parents of secondary school students, N=1,800 secondary school teachers, N=900 secondary school students.

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CAPGEMINI IS COMMITTED TO ENSURING TECHNOLOGY IS AN OPPORTUNITY FOR ALL

Digital transformation exposes a clear divide impacting all geographies and sectors. Basic digital skills are essential to working and staying informed in our modern age, but the marginalized are too often left behind. Today more than ever, there is a need to upskill talent to enable them to tackle today's and tomorrow's challenges and ensure that the digital revolution will benefit everyone. To contribute to bridging the digital divide, Capgemini is committed to supporting five million beneficiaries through its digital inclusion programs by 2030.

Bridging the digitally excluded to digital autonomy through digital literacy programs

As part of our efforts to close the gap, we are engaging in a number of initiatives with our ecosystems of partners to drive programs designed to inspire young people and women to gain technology and green skills, enabling them to pursue careers in tech. In 2022, Capgemini reached a cornerstone of its digital inclusion journey, positively impacting up to 1.8 million beneficiaries since the launch of its digital inclusion programs in 2018. From across the globe, Capgemini teams deployed impactful programs along with local NGO partners to deliver authentic and meaningful impact.

- In Central Europe, through a partnership with the ReDI School of Digital Integration, a non-profit coding school, the teams provide training programs to talented individuals, mainly with a refugee background, to help them acquire the skills they need to start their careers in the tech industry.

- In the US, through a partnership with non-profit Per Scholas, we provide skills training and access to individuals who are often excluded from tech careers.

- In India, through our partnership with the government on the Atal Innovation Mission (AIM) across 120 government and private schools in six Indian states, we equip high school students with 21st-century skills, a STEM mindset, and career exploration skills.

Providing skilling, upskilling, and job opportunities for populations at risk of unemployment through our Digital Academy

Our Digital Academy programs aim to deliver specialized training on IT and IT-enabled services (ITES) through courses that help the most disadvantaged individuals gain in-demand tech skills, allowing them to consider a tech career. Capgemini works closely with its NGO partners and clients to adapt the curriculum to local communities' needs. In 2022, Capgemini had 44 Digital Academy programs across 10 countries, where they trained students on key digital skills such as DevOps, coding, Java, full stack development, software testing, cloud web services, and cybersecurity. These programs are designed to maximize beneficiaries' employability post-training, and are adapted to local specificities to support underrepresented minorities:

- In the UK, through a three-year partnership with Code Your Future, the teams develop programs and training for refugees and those from disadvantaged backgrounds so they can become software developers and gain employment in the tech industry.

- With Capgemini Engineering in India, we addressed the topic of women in engineering through a Digital Academy program specializing in an ITES curriculum, called the SHE ARISE Women Empowerment Program. In partnership with NASSCOM, the program has enabled hundreds of women from low-income backgrounds to find employment in the tech sector.

- In Brazil, we launched the START program to accelerate the training of new talents in technology, valuing inclusion and diversity, with a free online course for 4–10 weeks on Java, AWS, and Salesforce.

Since the launch of our first Digital Academy in 2018, we have trained up to 25,735 individuals facing exclusion and hired 5,881 of them.

Leveraging technology and human energy to solve societal challenges through our Tech for Positive Futures program

Through our Tech for Positive Future (T4PF) program, we partner with government bodies, not-for-profit organizations, and social agencies to develop high-impact solutions in the areas of health and well-being, social inequalities, and climate adaptation. From hackathons to pro bono projects, we develop innovative solutions while working with our ecosystem of partners to deliver impact at scale. Our ongoing endeavor is to demonstrate how technology and business can drive positive change.

One of our key T4PF initiatives is a partnership with Generation Unlimited YuWaah, a multi-stakeholder global platform to prepare young people to transition from education and learning to productive work and active citizenship. Its mission is to bring together government, civil society, the private sector, the skilling ecosystem, and young people to curate and enable pathways toward social impact and economic opportunities. As a founding partner of YuWaah, Capgemini India has provided support in various ways – through funding, employees volunteering as mentors, and pro bono support.

Together, we will get the future we want for our people, our society, and our planet.

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Capgemini Research Institute is Capgemini's in-house think tank on all things digital. The Institute publishes research on the impact of digital technologies on large traditional businesses. The team draws on the worldwide network of Capgemini experts and works closely with academic and technology partners. The Institute has dedicated research centers in India, Singapore, the UK, and the US. It was recently ranked number one in the world by independent analysts for the quality of its research.

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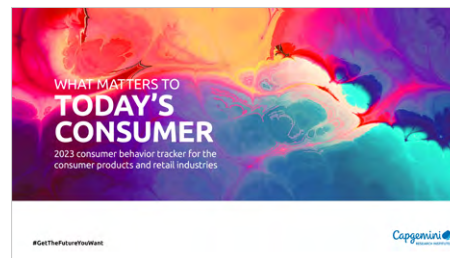lucie.taurines@capgemini.com

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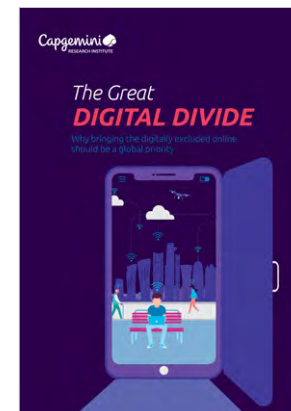jean-baptiste.perrin@capgemini.com

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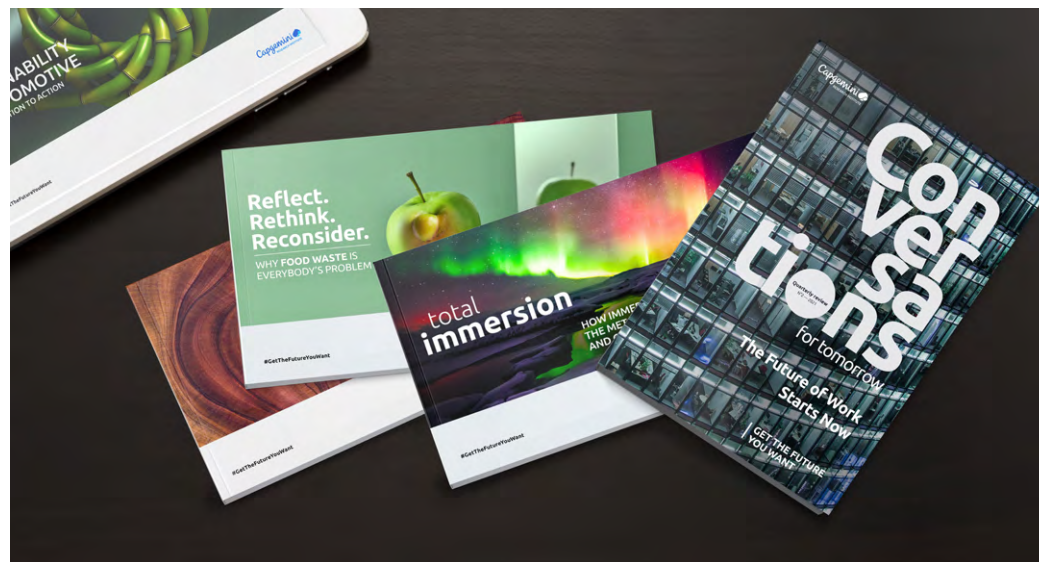**The key to designing inclusive tech: Creating diverse and inclusive teams**

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