Generation

LAUNCHING A TECH HIRING REVOLUTION

ABOUT GENERATION

Generation is a global nonprofit network that supports people to achieve economic mobility so they can change their lives. Launched in 2015, Generation comprises a global hub and a network of in-country affiliates that span 17 countries. We undertake original research to spur dialogue and action around critical workforce issues. And across our global network, we offer 35 profession-specific programs to train and place adults into careers that would otherwise be inaccessible. To date, Generation has 85,000+ graduates who have together earned more than $630 million in wages and works with 12,000+ employers.

CONTENTS

REPORT AT A GLANCE

In every country, across every industry, employers struggle to find and recruit entry-level tech talent. Our global nonprofit organization, Generation, sees this every day. Founded in 2015 to train and place learners of all ages into careers that are otherwise inaccessible, we sit at the intersection between thousands of employers and tens of thousands of jobseekers across 17 countries and 35 professions.

To help address this critical challenge, we launched what we believe is the most comprehensive global survey to date of entry-level tech talent. Participants included more than 2,600 jobseekers, another 1,275 jobholders already in tech roles, and 1,325 tech and non-tech employers, spanning eight countries: Brazil, Canada, France, Germany, India, Mexico, the United Kingdom, and the United States.

The report that follows goes into the details of what we found. The key takeaway: to repair tech's broken job ladder, employers should radically rethink how they approach the very first rung.

MOST COMPANIES STRUGGLE TO FILL ENTRY-LEVEL TECH ROLES

Employers across industries—86% of those we surveyed during November 2022 to January 2023—are hiring for entry-level tech roles. However, they are running into difficulties in sourcing talent.

- Nearly two-thirds of employers we surveyed (62%) are investing in entry-level tech talent pipelines—through methods like onboarding, mentorship, and internship programs—to increase the size and diversity of their talent pools and to enhance profitability.
- Despite these intentions, employers are struggling. More than half of employers surveyed (52%) said their company is finding it difficult to hire for entry-level tech positions. And 62% said that recruitment processes for entry-level roles need to change.

86%
OF EMPLOYERS ARE HIRING ENTRY-LEVEL TECH ROLES

62%
OF EMPLOYERS SEE THE NEED TO OVERHAUL THE ENTRY-LEVEL TECH HIRING PROCESS

OVER THE PAST THREE YEARS, MANY EMPLOYERS AROUND THE WORLD HAVE ADDED EDUCATION AND WORK EXPERIENCE REQUIREMENTS FOR ENTRY-LEVEL TECH ROLES BUT STILL FACE HIRING CHALLENGES

Most employers surveyed (61%) have added education- or experience-related hiring requirements, citing a need for greater efficiency in the hiring process.

- True entry-level jobs are becoming a thing of the past: 94% of employers across more than 16 industries said their hiring requirements for entry-level tech-relevant roles now include prior work experience in a related field.
- Education requirements, including university degree level and type, are also a significant barrier. About a third of unsuccessful applicants for tech roles (31%) said they were unable to meet those requirements and progress to the next recruiting stage.
- Among companies that added education or work experience requirements, 38% of their entry-level tech hires are women and 29% are from underrepresented groups.
- Many employers have also raised behavioral skill requirements, with 40% adding requirements for skills such as communication and teamwork.
- And our survey shows raising requirements is a worldwide challenge. Employers in middle-income countries, it turns out, have become even more reliant on degree-based and work experience hiring for entry-level tech roles than their rich country counterparts—60% of the employers we surveyed in middle-income countries said they now require a university degree and work experience, versus 41% in wealthier nations.
- Of these employers who have tightened criteria, 53% are still finding it difficult to fill their entry-level positions—and 70% see a need to revise their hiring process for entry-level talent.

61%

OF EMPLOYERS ADDED AT LEAST ONE EDUCATION OR WORK REQUIREMENT IN THE PAST THREE YEARS

BUT A PIONEERING MINORITY OF EMPLOYERS THAT RELY ON SKILLS-BASED HIRING TECHNIQUES FARE BETTER IN TWO KEY WAYS
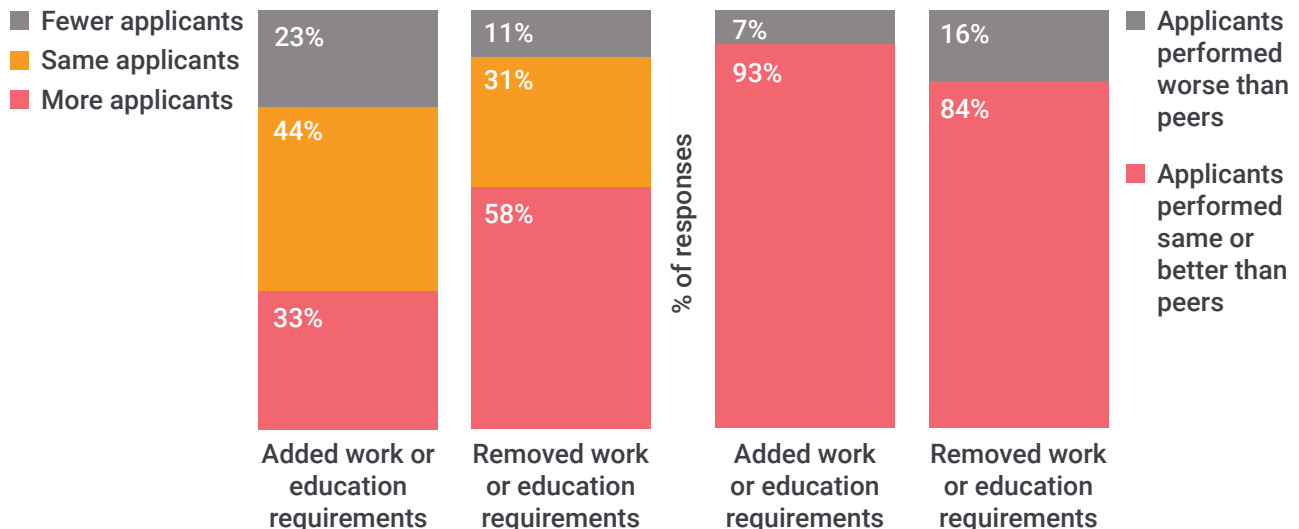
About a quarter of the employers we surveyed (24%) have removed education or work experience requirements for entry-level tech roles, replacing them with demonstration-based competencies. The result has been a more inclusive recruitment process that attracts more candidates, with comparable candidate quality and performance on the job. (Fig. 1)

- 58% of the companies that removed at least one degree or work experience requirement saw an increase in the number of applicants, allowing them to hire more candidates more quickly. In addition, opening up new talent pools increases the odds of bringing in diverse talent.
- 84% of the companies we surveyed indicated that candidates they hired after redefining requirements performed just as well on the job, if not better, than those hired under more stringent requirements.
- Further, employers that redefined requirements are spending less. Their counterparts who added requirements spend 13% more than those who removed them.

FIGURE 1
EMPLOYERS THAT REDUCE BARRIERS TO APPLICATION FOR ENTRY-LEVEL TECH ROLES...

...are more likely to increase the number of applicants than those increasing barriers to application

...while still maintaining a high-quality applicant pool

- ■ Fewer applicants
- ■ Same applicants
- ■ More applicants

Added work or education requirements: 23% / 44% / 33%

Removed work or education requirements: 11% / 31% / 58%

% of responses

Added work or education requirements: 7% / 93%

Removed work or education requirements: 16% / 84%

- ■ Applicants performed worse than peers
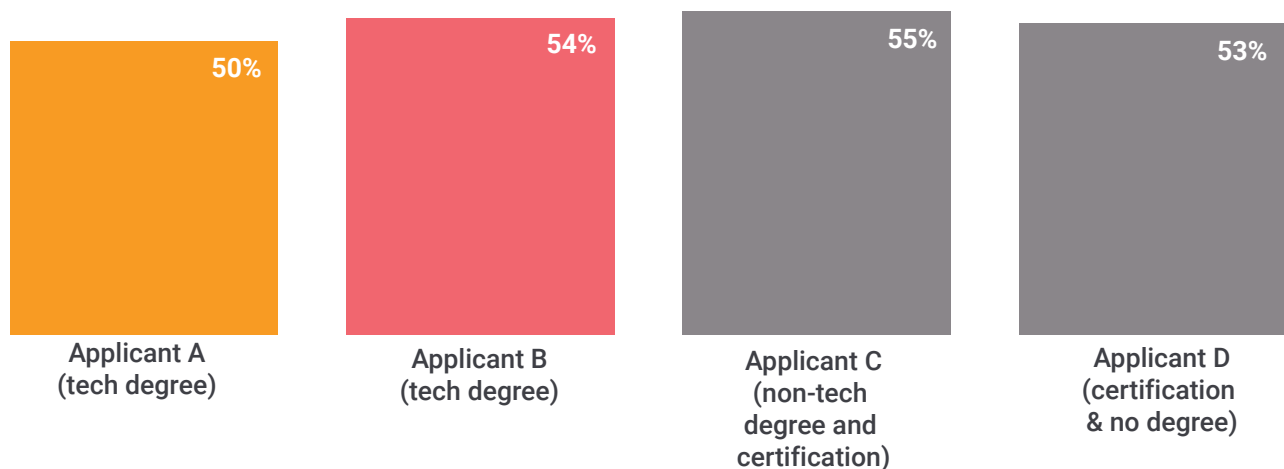- ■ Applicants performed same or better than peers

n employers that added requirements=804, n employers that redefined requirements=323

SKILLS-BASED HIRING TECHNIQUES ALSO FOSTER GREATER ETHNIC DIVERSITY, THOUGH GENDER BIAS PERSISTS

- Skills-based assessments—and tech industry certifications in particular—can equalize hiring opportunities for individuals without university degrees. When employers reviewed blind resumes, they were equally likely to offer an interview to candidates with degrees or with certifications (the likelihood ranging from 50–55%). (Fig. 2)
- Certifications similarly serve as a hiring process equalizer across ethnicities. Candidates from underrepresented groups without certifications or STEM degrees gained one interview and one offer for every five applications, whereas those from majority ethnic groups saw the same results with only four applications. With certifications, both groups perform the same. (Fig. 3)
- But there is still a large gap to close when it comes to gender. Case in point, all of the men without certification who landed interviews also moved to a job offer, versus only 60% of women with certification who moved from interview to offer. (Fig. 4)
- Further affecting diversity, hiring team background has implications for who is hired. Surveyed hiring managers with a university degree were twice as likely to say they would be open to hiring a candidate with a university degree than those with a high school diploma.
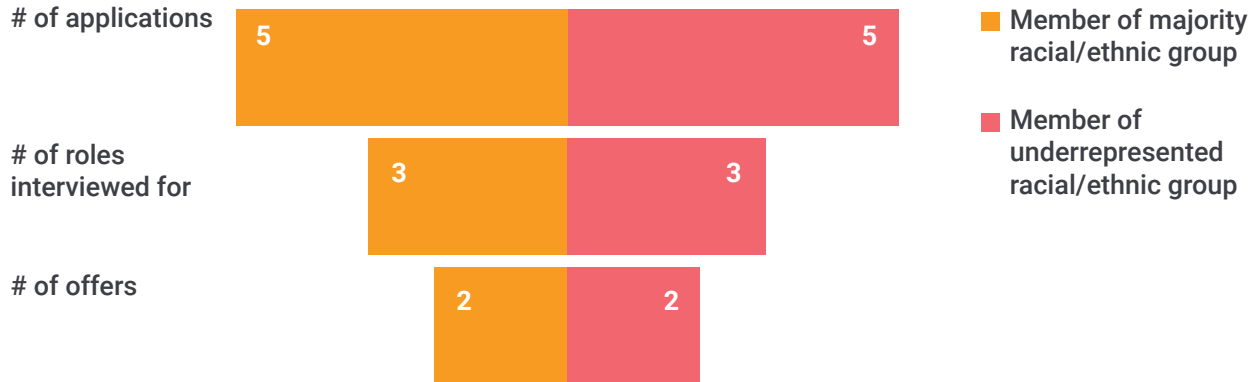
FIGURE 2
EMPLOYERS VIEW APPLICANTS WITH TECH CERTIFICATIONS AS FAVORABLY AS THOSE WITH TECH DEGREES
Likelihood of employer to offer interview after reviewing CV

| Applicant A (tech degree)	Applicant B (tech degree)	Applicant C (non-tech degree and certification)	Applicant D (certification & no degree)
50%	54%	55%	53%

n employers=1,325, from which n employers that evaluated applicant A=675, applicant B=667, applicant C=664, applicant D=644

FIGURE 3
CERTIFICATIONS HAVE A LEVELING EFFECT FOR UNDERREPRESENTED RACIAL AND ETHNIC GROUPS

# of applications	5 / 5
# of roles interviewed for	3 / 3
# of offers	2 / 2

Legend:
- Member of majority racial/ethnic group
- Member of underrepresented racial/ethnic group

Note: individuals with certifications may also have degrees; values represent median of survey responses. n member of majority group=899, n member of underrepresented group=152

FIGURE 4
HOWEVER, GENDER BIAS PERSISTS DESPITE THE LEVELING EFFECTS OF CERTIFICATIONS
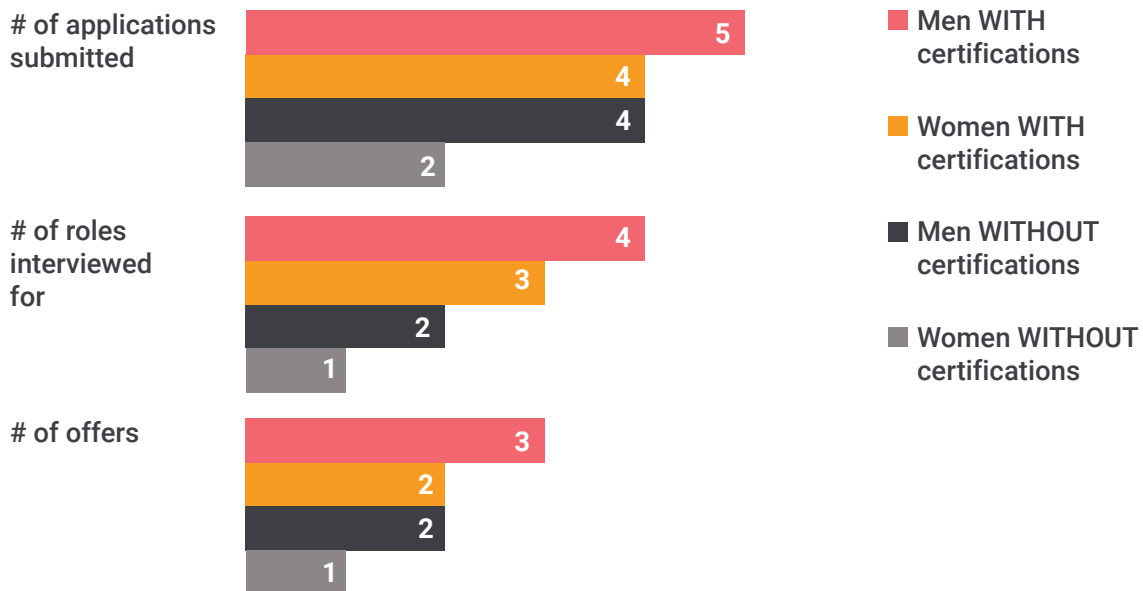
# of applications submitted
- Men WITH certifications: 5
- Women WITH certifications: 4
- Men WITHOUT certifications: 4
- Women WITHOUT certifications: 2

# of roles interviewed for
- Men WITH certifications: 4
- Women WITH certifications: 3
- Men WITHOUT certifications: 2
- Women WITHOUT certifications: 1

# of offers
- Men WITH certifications: 3
- Women WITH certifications: 2
- Men WITHOUT certifications: 2
- Women WITHOUT certifications: 1

Legend:
- Men WITH certifications
- Women WITH certifications
- Men WITHOUT certifications
- Women WITHOUT certifications

Note: individuals with certifications may also have degrees. n men with certifications=772, n women with certifications=279, n men without certifications=561, n women without certifications=506

THESE FOUR INGREDIENTS CAN RESHAPE HIRING REQUIREMENTS AND DEEPEN TALENT POOLS

Even though employers are strongly motivated to expand their entry-level tech pipelines, they are struggling to shift restrictive hiring processes—with tight budgets and a lack of executive support proving to be tough obstacles. We believe four bold actions can unlock the necessary change:

1. Bring back the entry-level job. At the start of the hiring funnel, remove work experience and degree requirements and use certifications and other skills indicators to increase applicant pools.

2. During the hiring process, use technical assessments to ensure applicants have the necessary skills for the job.

3. Throughout the process, pay attention to behavioral skills as well as technical capabilities.

4. Rethink hiring teams to reduce tacit bias and increase talent diversity.

We are continuing to explore the possibilities of skills-based approaches, and we plan to assemble a coalition of employers from across the world that want to make these kinds of changes to test and learn together.

DETAILED FINDINGS

AS INDUSTRIES DIGITIZE

## EMPLOYERS ARE CREATING ENTRY-LEVEL TECH ROLES IN LARGE NUMBERS— BUT ARE STRUGGLING TO FILL THEM

A WORLDWIDE BOOM IN TECH HIRING

Layoffs by Big Tech companies obscure the true picture: demand for tech talent, particularly at the entry-level, is booming across the world. In nearly every country, across every industry, the march of digitization continues and is set to accelerate: every company is becoming a tech company.

Companies are adding a wide array of tech roles to their workforces—from healthcare, to retail, to manufacturing. Research confirms this: for example, in analysis by the International Labor Organization (ILO) data from 21 European countries shows tech jobs increased by 5% per year between 2010 and 2019. In the United States, tech employment grew at 3.3% per year between 2011 and 2021—nearly 10 times the rate of growth in general employment. (Figs. 5 & 6)
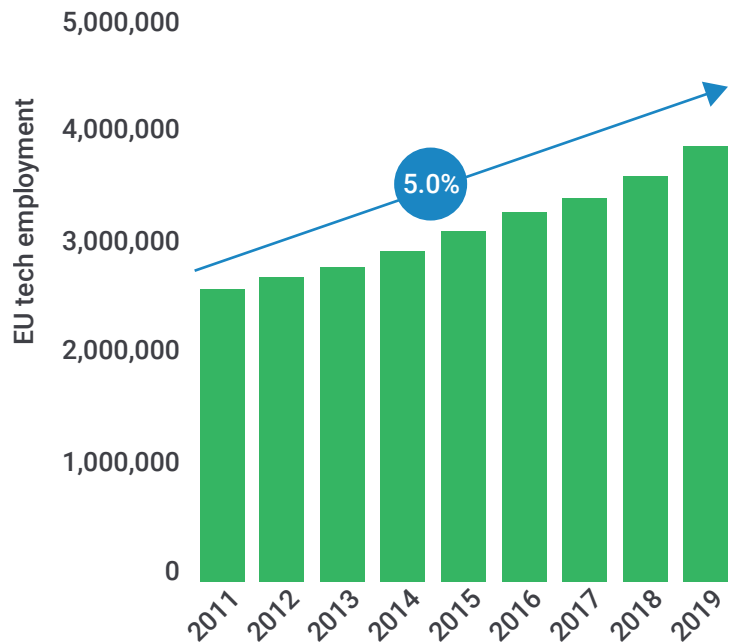
FIGURE 5

Tech employment in the United States grew at an annual rate of 3.3% between 2011 and 2021, with an even higher growth rate among tech managers as compared to professionals
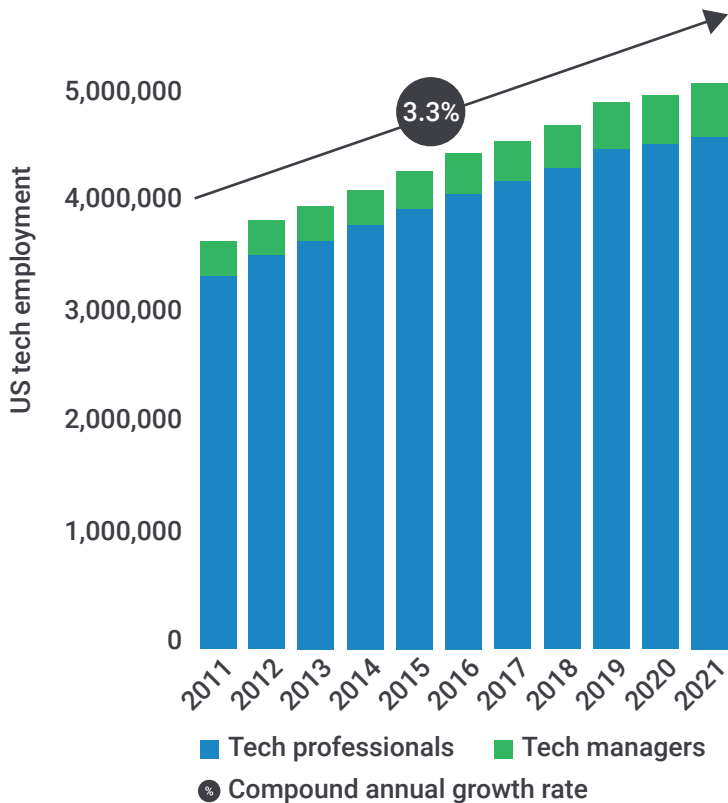
Source: U.S. Bureau of Labor Statistics

FIGURE 6

Tech employment in the European Union grew at an annual rate of 5.0% between 2011 and 2019

Source: International Labour Organization

THE NUMBER OF ENTRY-LEVEL TECH POSITIONS IS GROWING EVEN FASTER

Generation's employer survey confirms the boom in tech hiring—particularly in entry-level positions. We found that 86% of employers surveyed are hiring entry-level tech roles, higher than the proportion hiring for entry-level non-tech roles. This was true across industries.

86%

OF EMPLOYERS ARE HIRING ENTRY-LEVEL TECH ROLES

FIGURE 7
EMPLOYERS ARE INVESTING IN ENTRY-LEVEL TECH TALENT PIPELINES
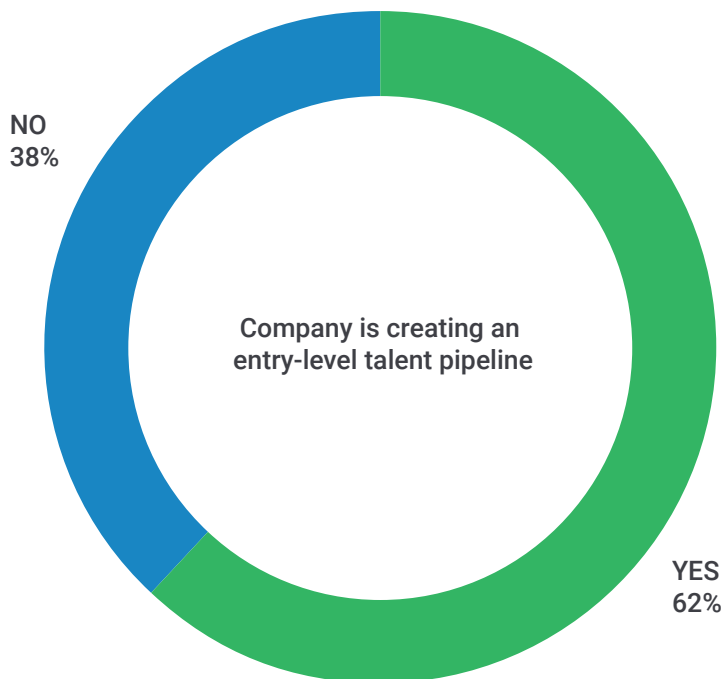
Recognizing the urgency of filling entry-level tech roles, 62% of the employers we surveyed reported that they are investing in things like onboarding, mentorship, and internships to build an entry-level tech talent pipeline for their organization. (Fig. 7) Half (50%) of employers believe that recruiting entry-level tech talent will enhance their company's profitability and growth—compared to just 10% who don't.
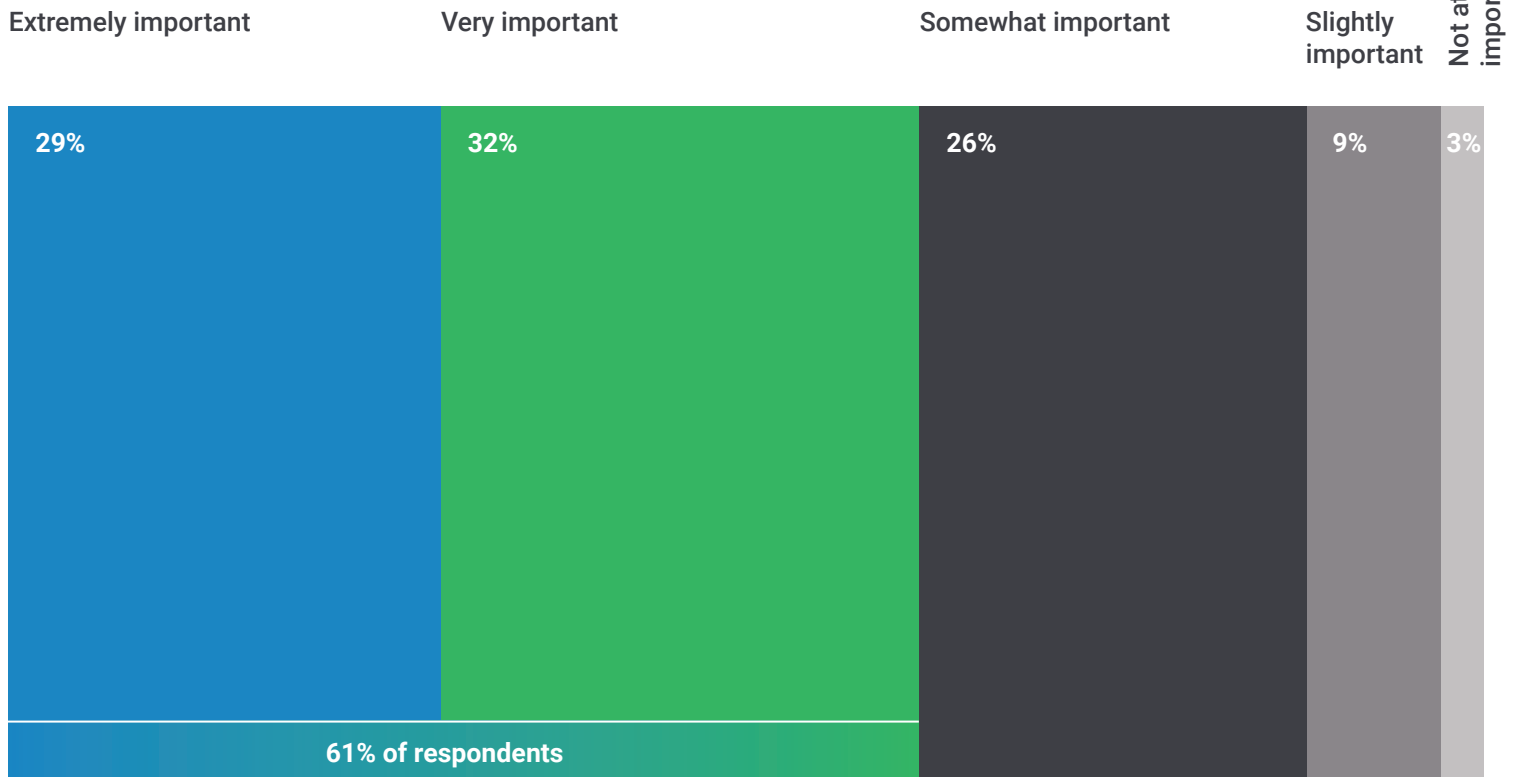
NO 38%

Company is creating an entry-level talent pipeline

YES 62%

n employers=1,325

14

THE DESIRE FOR GREATER DIVERSITY REMAINS STRONG

Most employers also value diversity in the workplace: 61% of those employers surveyed said that diversity, equity, and inclusion (DEI) is an important goal, while only 3% said it is not important. (Fig. 8)

Hiring more entry-level tech roles deepens an employer's reach into the tech talent pool and affords recruiters the opportunity to engage with a greater diversity of candidates.

FIGURE 8
EMPLOYERS SAY DIVERSITY, EQUITY, AND INCLUSION IS IMPORTANT

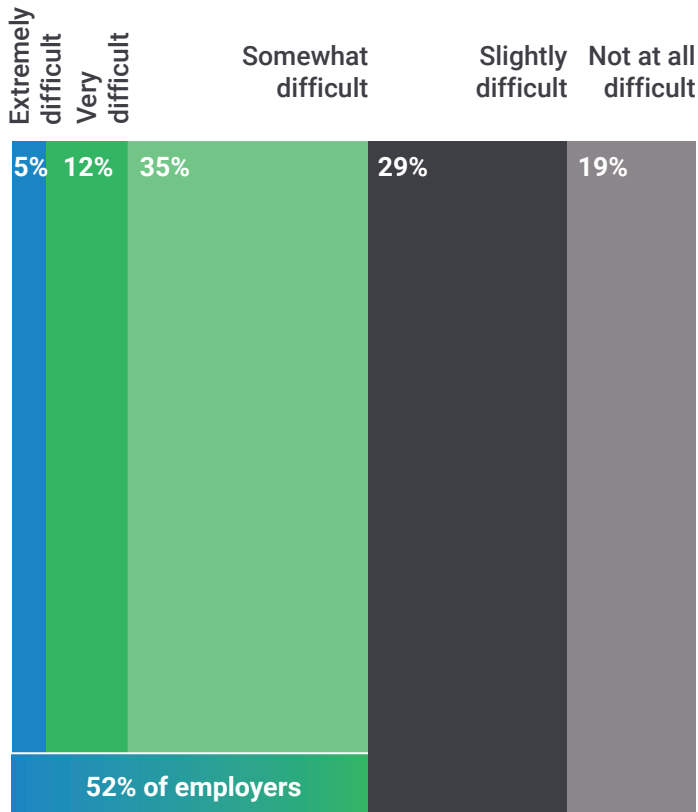| Extremely important	Very important	Somewhat important	Slightly important	Not at all important
29%	32%	26%	9%	3%

61% of respondents

n employers=1,325

BUT FILLING THOSE OPEN ENTRY-LEVEL ROLES IS HARD

Although our survey highlights a clear intention on the part of employers to recruit more entry-level tech roles, they are having trouble sourcing this talent. Most company respondents—52% of the total—reported they are finding it extremely difficult, very difficult, or somewhat difficult to hire for entry-level tech positions. (Fig. 9) And 62% said their entry-level hiring process needed to change.
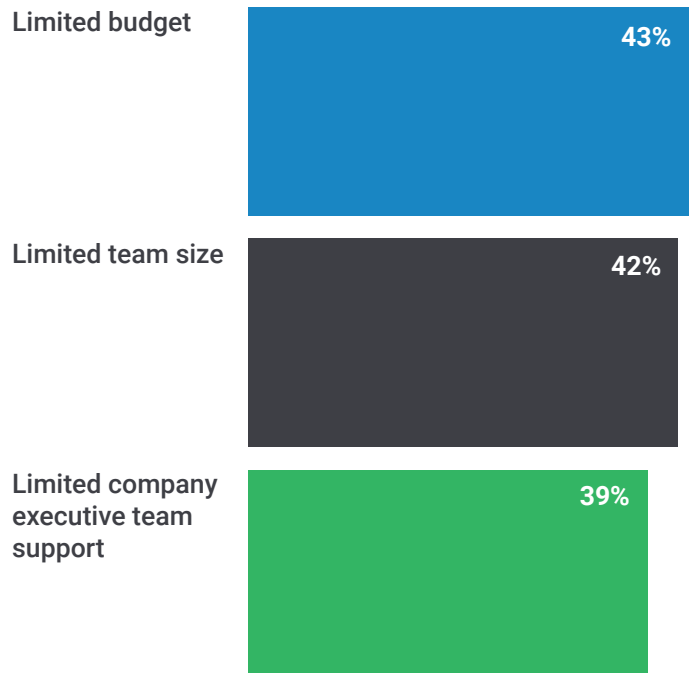
Often, however, human resources teams feel unable to shift their hiring processes, and employers face several barriers to change. The most significant of these, according to our survey, are budget constraints and lack of senior executive support—but these are not the only issues. (Fig. 10)

Extremely difficult	Very difficult	Somewhat difficult	Slightly difficult	Not at all difficult
5%	12%	35%	29%	19%

52% of employers

n employers=1,325

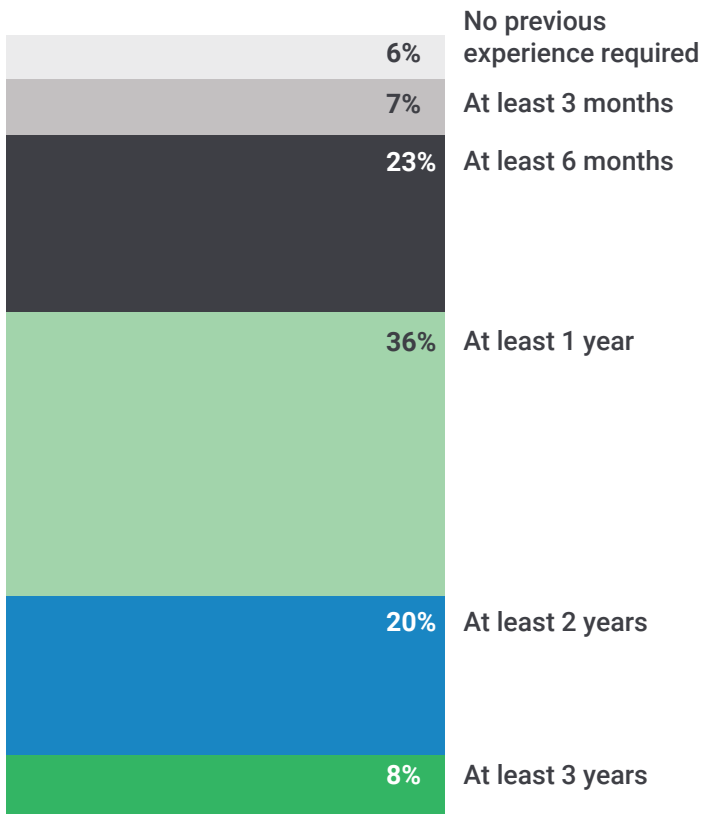|	
Limited budget	43%
Limited team size	42%
Limited company executive team support	39%

n employers=1,325

EDUCATION AND EXPERIENCE

REQUIREMENTS ARE THE BIGGEST BARRIERS FACING ENTRY-LEVEL TECH APPLICANTS— YET A MAJORITY OF EMPLOYERS HAVE BEEN RAISING THEM

THE DISAPPEARING TRUE ENTRY-LEVEL JOB

You might assume that a starting position, by definition, would require minimal work experience. In fact, despite growing demand for talent with digital skills, the vast majority (94%) of employers across all industries said their hires for entry-level tech roles must have at least some work experience in a related field. Around 66% required one year of experience or more, while about a third (28%) called for two years or more. (Fig. 11)
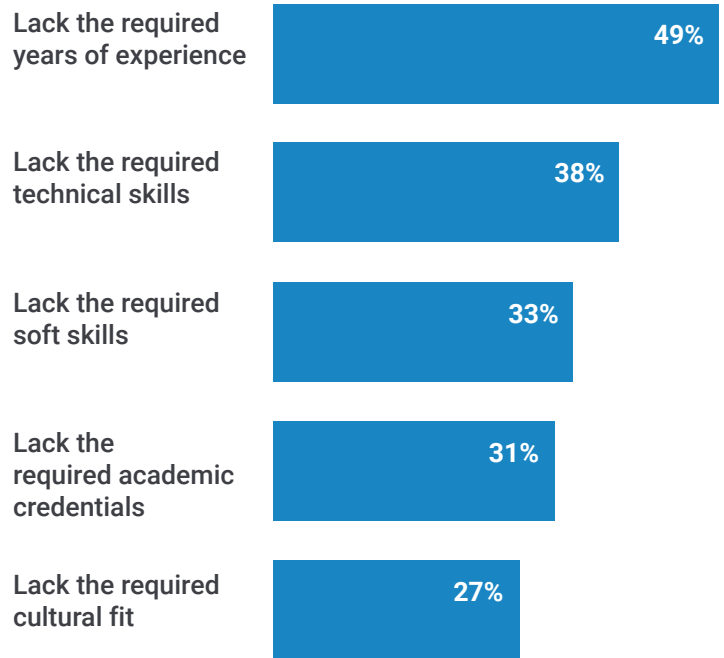
Our survey of job applicants confirms this standard, with half of respondents (49%) reporting that where given a reason, their applications for entry-level tech positions were unsuccessful because they lacked sufficient experience. (Fig. 12)

FIGURE 11
MOST ENTRY-LEVEL ROLES REQUIRE WORK EXPERIENCE

6%	No previous experience required
7%	At least 3 months
23%	At least 6 months
36%	At least 1 year
20%	At least 2 years
8%	At least 3 years

n employers=1,325

FIGURE 12
ENTRY-LEVEL CANDIDATES ARE MOST OFTEN TOLD INEXPERIENCE IS THE REASON THEY WEREN'T HIRED

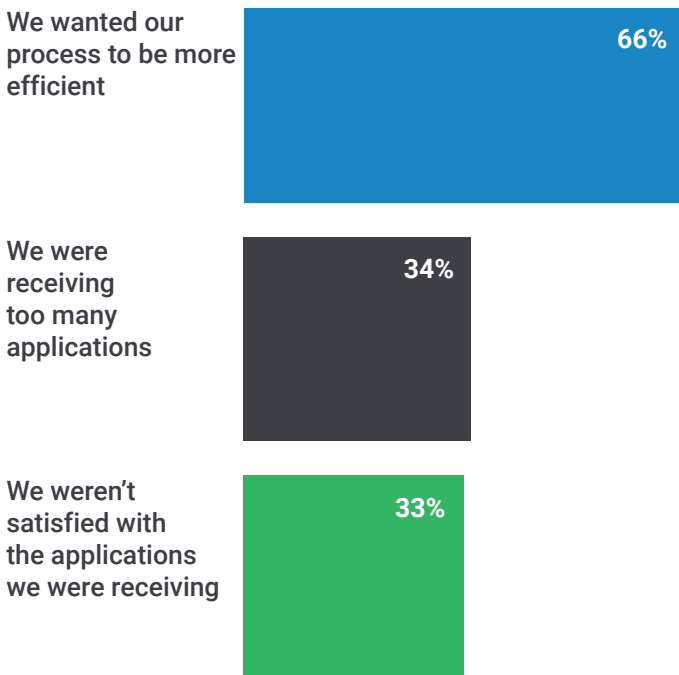|	
Lack the required years of experience	49%
Lack the required technical skills	38%
Lack the required soft skills	33%
Lack the required academic credentials	31%
Lack the required cultural fit	27%

n jobseekers=738

19

MAKING THE CUT AT MOST COMPANIES IS HARDER THAN EVER

MOST EMPLOYERS ADD HIRING REQUIREMENTS TO BE MORE EFFICIENT

More recently, a majority of employers have moved to *add* education- and experience-related hiring requirements. Our survey results reveal that in the past three years, 61% of employers added to either their education or their experience-related tech role hiring requirements—or both. Nearly two-thirds (66%) said they made these changes to make their hiring process more efficient. (Fig. 13) As it turns out, however, these added requirements have made it even harder to bring capable entry-level talent on board.

61%

OF EMPLOYERS ADDED AT LEAST ONE EDUCATION OR WORK REQUIREMENT IN THE PAST THREE YEARS

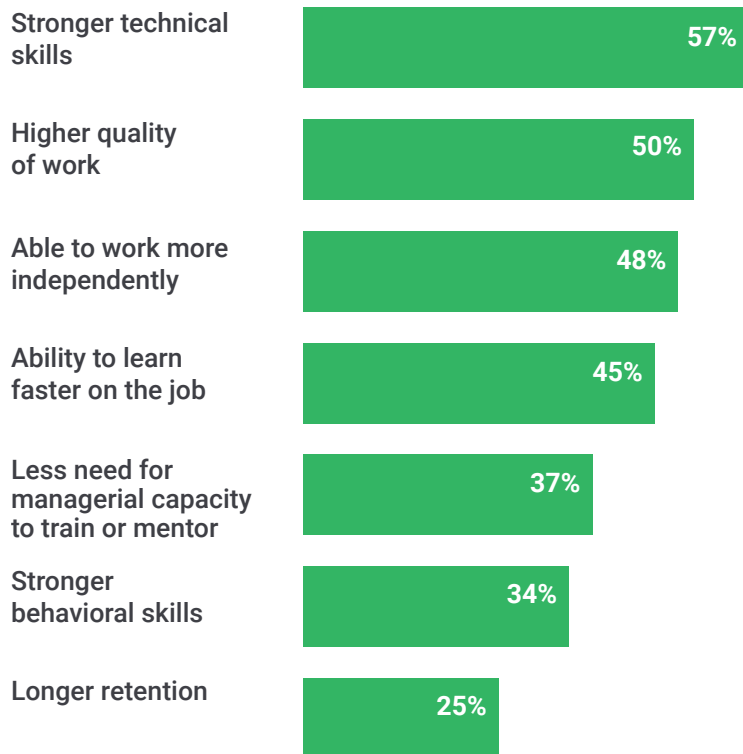|	
We wanted our process to be more efficient	66%
We were receiving too many applications	34%
We weren't satisfied with the applications we were receiving	33%

n employers=804

WE'RE HIRING: BUT WORK EXPERIENCE REQUIRED

Employers justify work experience requirements by counting on the anticipated competency of more experienced candidates, which allows recruiters to filter candidates efficiently. Three chief reasons, each cited by 45–60% of surveyed employers (Fig. 14), are:

- Applicants with work experience are assumed to have stronger technical skills
- Such candidates produce a higher quality of work
- Those candidates are better at working independently

This drive for efficiency has seen 37% of surveyed employers add work experience requirements in the last three years, compared to 10% that have removed some of their work experience requirements. (Fig. 15)

FIGURE 14
REASONS FOR REQUIRING MORE THAN ONE YEAR OF EXPERIENCE FOR ENTRY-LEVEL TECH ROLES

Reason	Percentage
Stronger technical skills	57%
Higher quality of work	50%
Able to work more independently	48%
Ability to learn faster on the job	45%
Less need for managerial capacity to train or mentor	37%
Stronger behavioral skills	34%
Longer retention	25%

n employers=852

FIGURE 15
MANY EMPLOYERS HAVE INCREASED WORK EXPERIENCE REQUIREMENTS

| Category	Percentage
Removed work experience requirements	10%
No change	53%
Added work experience requirements	37%
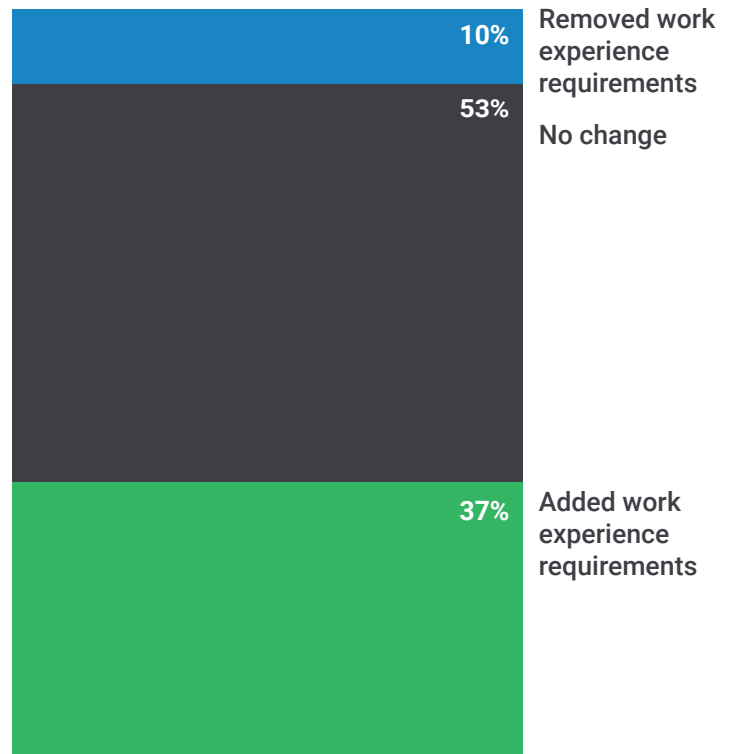
n employers=1,325

WE'RE HIRING: BUT MUST HAVE A DEGREE TOO

Half of the employers surveyed had a degree requirement for entry-level tech roles, with 17% seeking candidates with a more specific STEM degree. (Fig. 16)

Education requirements are particularly prohibitive, with about a third of unsuccessful tech role applicants reporting that they fell short on that metric when given a reason for not progressing to the hiring stage of the recruitment process.

This is a challenge around the world. Degree requirements seem to carry more weight in middle-income countries, where three out of five employers require a university degree, compared to two out of five in high-income countries. A further differentiation can be seen between large and small companies—51% of employers at the large companies we surveyed required a university degree, compared to 37% at small companies. (Fig. 17)

FIGURE 16
DEGREE REQUIREMENTS ARE PREVALENT WITH ADVANCED REQUIREMENTS RELATIVELY COMMON

% of employers

Bachelor's degree	49%
Master's degree	20%
STEM background	17%
No specific requirement	7%
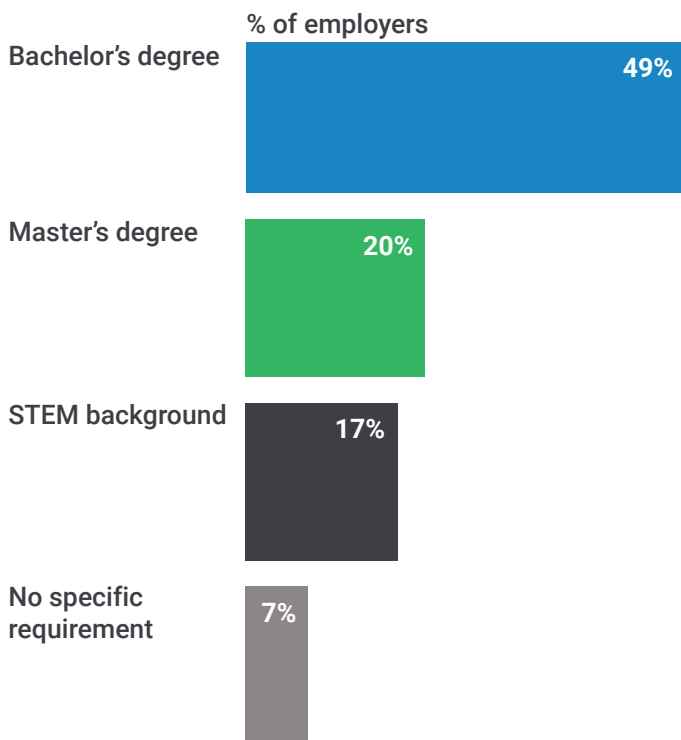
n employers=1,325

FIGURE 17
THERE IS VARIATION IN THE TYPES OF EMPLOYERS THAT REQUIRE UNIVERSITY DEGREES

Middle-income country: 60%
High-income country: 41%
Location of employer

Large: 51%
Small: 37%
Size of employer
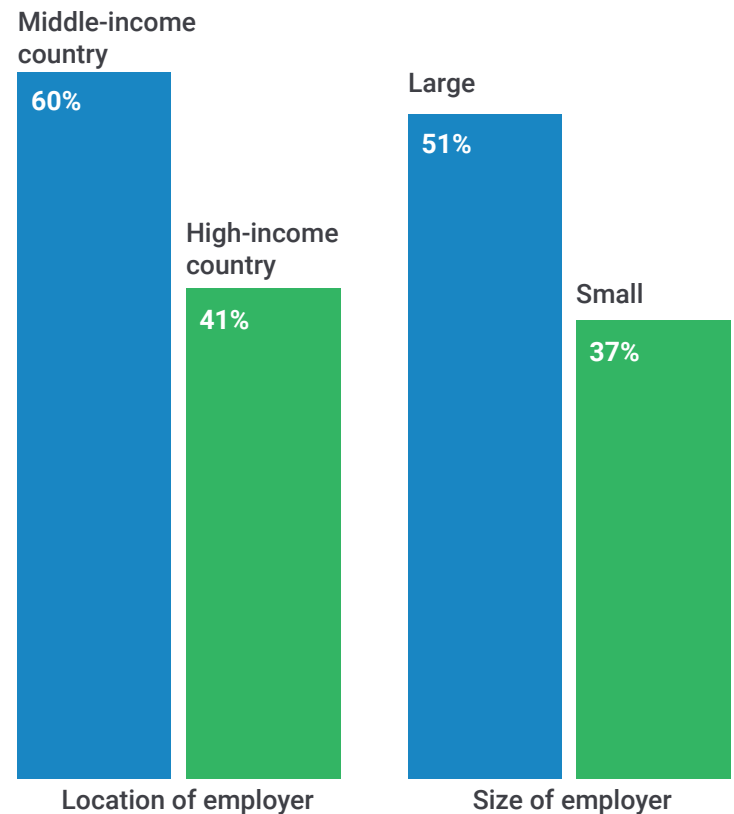
n employers=1,325 from which n middle-income country=547, n high-income country=778, n large companies=702, n small companies=167

NOW LET'S ADD EVEN MORE DEGREE REQUIREMENTS

Education requirements were steep to begin with, and they have only increased, with about a third of employers (30%) adding degree requirements over the last three years, while just 13% removed education filters over the same period. (Fig. 18)
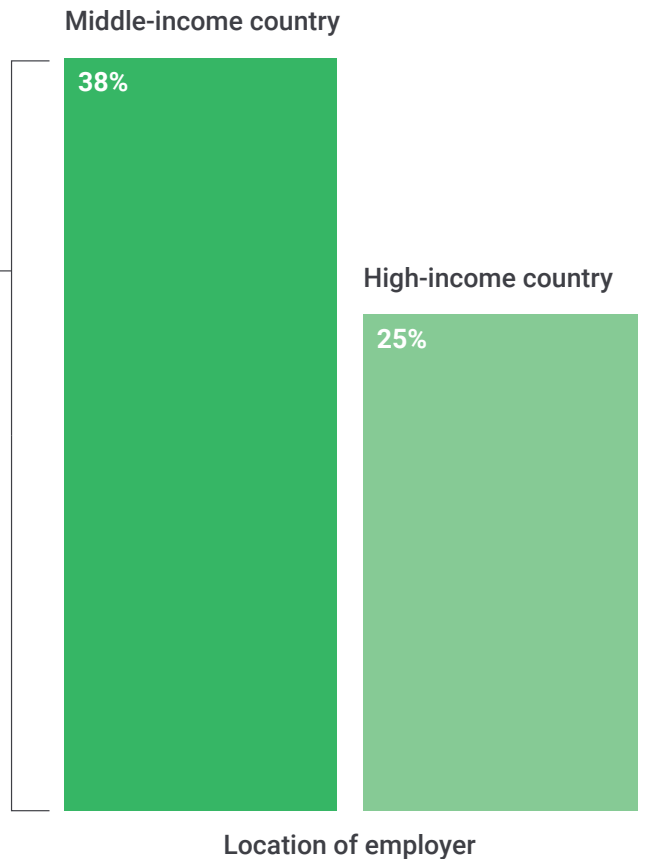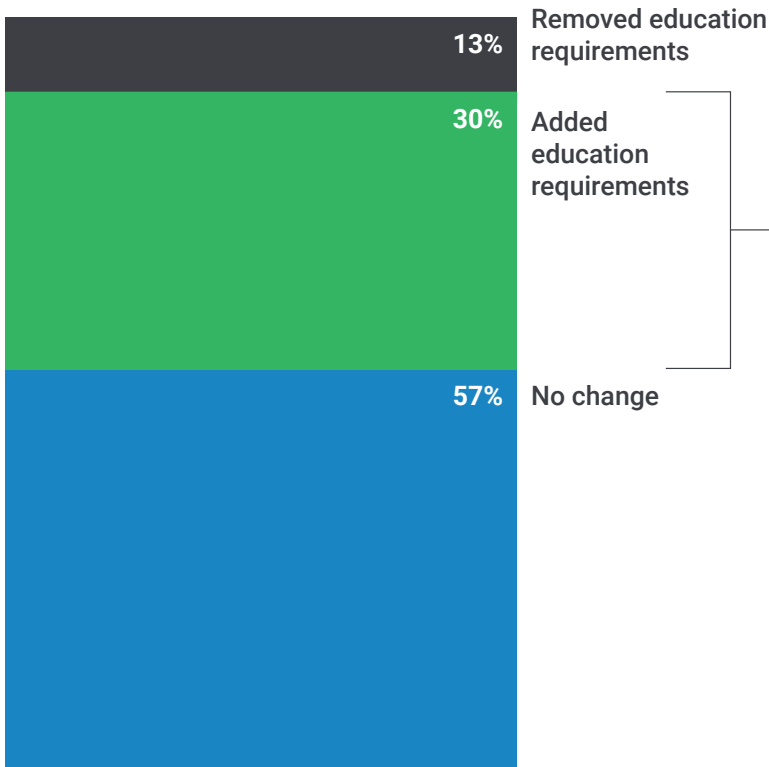
In middle-income countries, 38% of employers added to their degree requirements, compared to 25% in high-income countries.

STEM degrees are gaining even more ground in the recruitment space, with 34% of employers tightening this requirement, and only 9% removing it as a barrier in the last three years.

FIGURE 18
MANY EMPLOYERS HAVE ADDED EDUCATION REQUIREMENTS

13%	Removed education requirements
30%	Added education requirements
57%	No change

THERE IS GLOBAL VARIATION IN ADDING EDUCATION REQUIREMENTS

Middle-income country
38%

High-income country
25%

Location of employer

n employers=1,325
from which n middle-income countries=547, n high-income countries=778

# THE UNINTENDED RESULTS: MORE COST, LESS EFFICIENCY...

Despite their quest for efficiency, this increase in requirements has left employers with a more costly recruitment process, which still falls short of expectations.

Our survey shows that of the 800+ employers that introduced additional degree or work experience requirements, they are spending 13% more on average to recruit entry-level talent than those that removed requirements.

13%

INCREASE IN COST PER RECRUIT FOR EMPLOYERS WHO ADDED REQUIREMENTS

FIGURE 19
EMPLOYERS WHO ADDED REQUIREMENTS FIND ENTRY-LEVEL ROLES HARD TO FILL
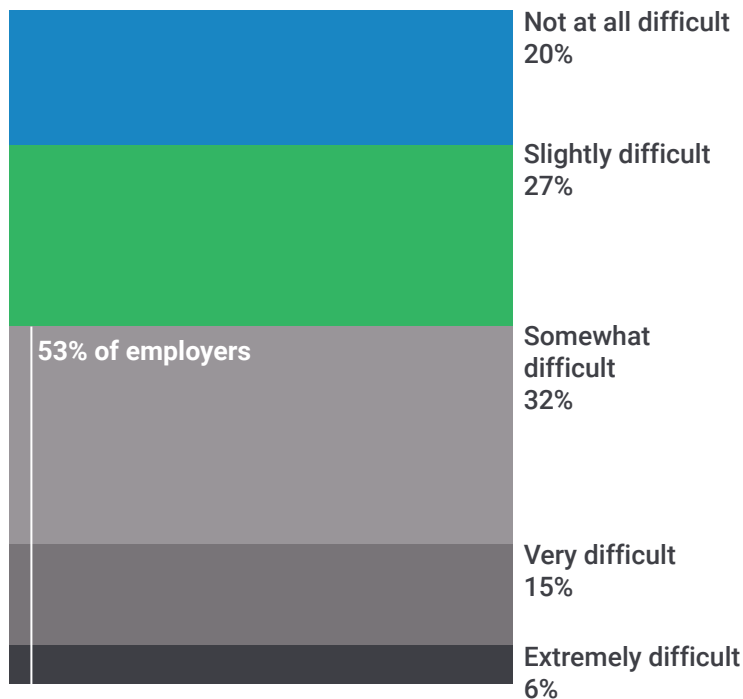
Of the employers that have tightened criteria, 53% are finding it extremely difficult, very difficult, or somewhat difficult to fill entry-level positions in their organization (Fig. 19)—and 70% recognize a need to revise the hiring process for entry-level talent.

Not at all difficult
20%

Slightly difficult
27%

53% of employers

Somewhat difficult
32%

Very difficult
15%

Extremely difficult
6%

n employers increasing requirements=804
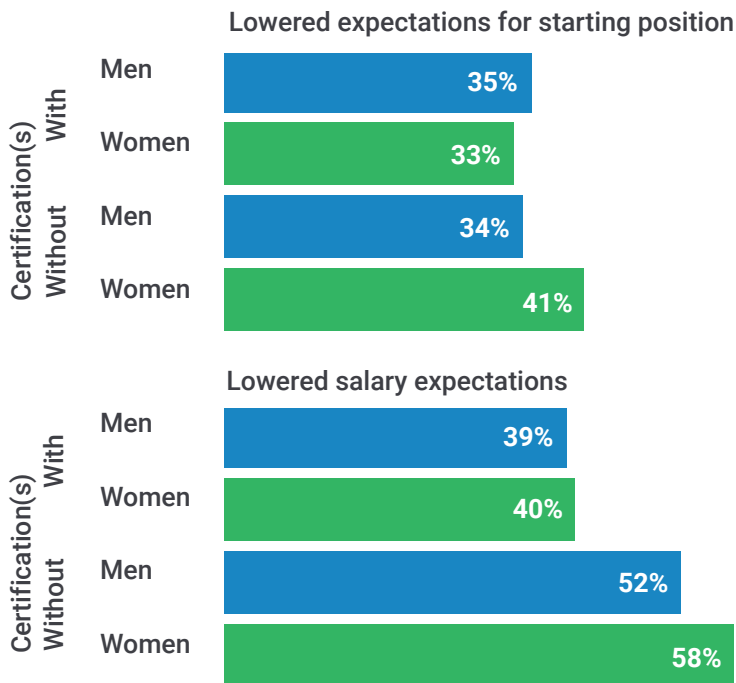
24

... AND MISSING THE MARK ON DIVERSITY AS WELL

Current tech hiring trends adversely affect the career potential of historically underrepresented groups. If companies stick to these recruitment methods, they may miss opportunities to recruit diverse talent. Among companies that added requirements, 38% of their entry-level tech hires are women and 29% are from underrepresented groups.

Women seeking tech roles often compromise on salary, our survey of jobseekers found. In contrast, men applying for tech roles are more likely than women to apply for jobs with a higher median salary. Similarly, 39% of women said they would likely opt for lower starting positions, compared to 34% of men with variation among those with/without certificates. (Fig. 20)

This is also true for applicants who self-identify as belonging to an underrepresented group in their country. These jobseekers apply for tech roles with salaries that are around 31% lower than those of their peers from majority groups.

Applicants from underrepresented groups are more likely to take on less permanent forms of employment than applicants from majority groups. Almost half of applicants from underrepresented groups who responded to our survey applied for paid trainee, intern, or apprentice positions. But less than a third of applicants not from these groups reported doing the same. (Fig. 21)

FIGURE 20
CANDIDATES ADJUST POSITION EXPECTATIONS (TOP) AND SALARY EXPECTATIONS (BOTTOM)

Lowered expectations for starting position

Certification(s)		
With	Men	35%
With	Women	33%
Without	Men	34%
Without	Women	41%

Lowered salary expectations

Certification(s)		
With	Men	39%
With	Women	40%
Without	Men	52%
Without	Women	58%

n women without certifications=506, n women with certifications=279,
n men without certifications=772, n men with certifications=561

FIGURE 21
JOBSEEKERS FROM UNDERREPRESENTED GROUPS ARE MORE LIKELY TO APPLY FOR LESS PERMANENT ROLES

47%
Members of underrepresented racial or ethnic groups

28%
Members of majority racial or ethnic groups
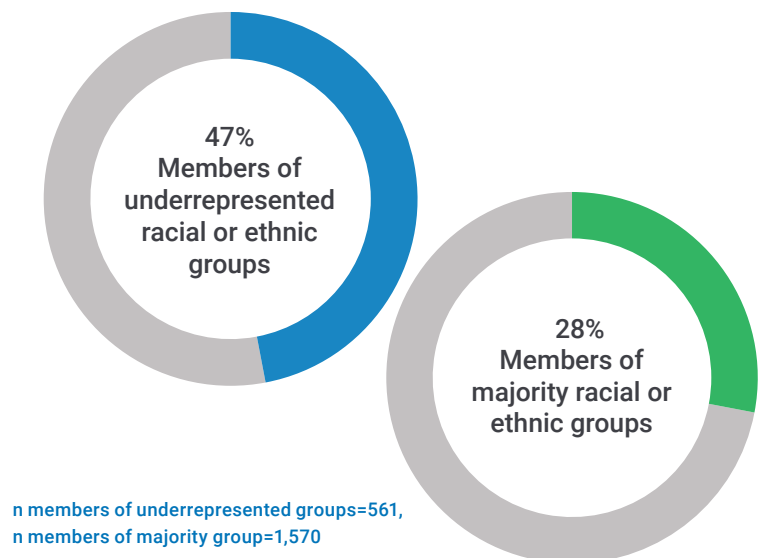
n members of underrepresented groups=561,
n members of majority group=1,570

NOW THE GOOD NEWS:

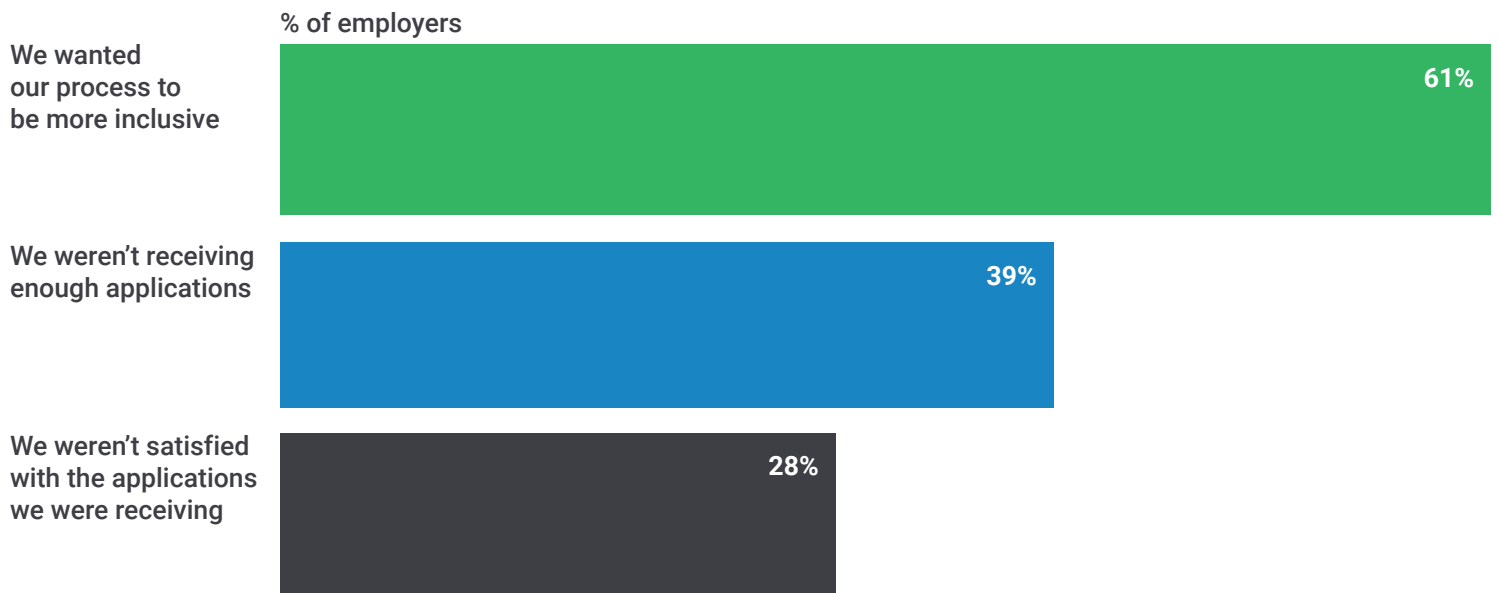## PIONEERING EMPLOYERS THAT REDEFINED HIRING REQUIREMENTS AND USED SKILLS-BASED METHODS EXPANDED TALENT POOLS—WITH LITTLE PERFORMANCE TRADE OFF

REIMAGINING HIRING REQUIREMENTS

Even as the majority of employers have been tightening hiring requirements, a small group of employers across the world—24% of those who participated in our survey—no longer require the same level of work experience or specific degree backgrounds to fill entry-level roles.

These employers have redefined their requirements to be more skills-based, most often in the name of inclusivity. (Fig. 22) And they have discovered other benefits as well.

FIGURE 22
EMPLOYERS CITE VARIED REASONS FOR REMOVING HIRING REQUIREMENTS

% of employers

Reason	%
We wanted our process to be more inclusive	61%
We weren't receiving enough applications	39%
We weren't satisfied with the applications we were receiving	28%

n employers=323

27

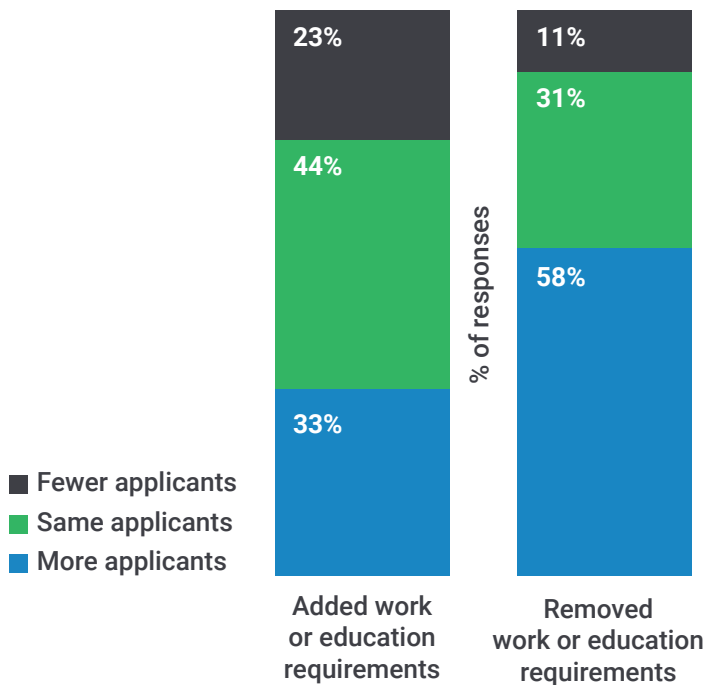# MORE APPLICANTS, MORE FILLED POSITIONS— AND COMPARABLE PERFORMANCE

Redefining requirements for entry-level tech roles has given employers a larger talent pool to draw from. 89% of companies that removed at least one requirement noted the same number (31%) or an increase (58%) in applicants compared to before. (Fig. 23)

While quantity does not necessarily beget quality, these applicants, compared to their more experienced or formally educated counterparts, also delivered excellent performance. An overwhelming majority (84%) of employers said the individuals they hired after removing requirements performed the same or even better than those hired using the more traditional screens of degrees and experience as predictors of potential competence.
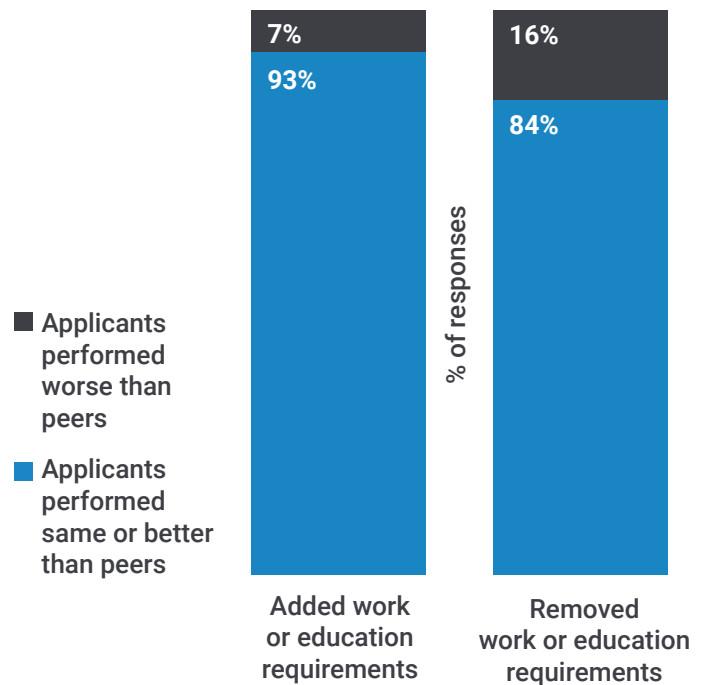
Specifically, half of them agreed that these non-traditional applicants performed as well on the job as previous applicants had done, and just over a third (34%) said these applicants performed *better* than their more traditional peers.

FIGURE 23
EMPLOYERS THAT REDUCE BARRIERS TO APPLICATION FOR ENTRY-LEVEL TECH ROLES...

...are more likely to increase the number of applicants than those increasing barriers to application...

...while still maintaining a high-quality applicant pool

Legend:
- Fewer applicants
- Same applicants
- More applicants

- Applicants performed worse than peers
- Applicants performed same or better than peers

n employers that increased requirements=804,
n employers that redefined requirements=323

28

THE GOLD STANDARD: SKILLS-BASED HIRING

Where degree and past work experience criteria no longer provide the main filter, alternative screening criteria will be necessary. A minority of employers around the world are turning to skills-based assessment and evaluating job candidates based on things like technical interviews, technical assessments, and industry-recognized technical certifications.

As this shift occurred, reliance on these new tools has risen. Among employers that removed at least one of their education and work experience requirements over the past three years, 38% reported increasing requirements associated with technical assessments, and 41% increased requirements associated with technical interviews. (Fig. 24)

FIGURE 24
MANY EMPLOYERS WHO REMOVED WORK EXPERIENCE OR DEGREE REQUIREMENTS INCREASED SKILLS-BASED ASSESSMENT REQUIREMENTS

% of employers

Increased requirements associated with technical interviews	41%
Increased requirements associated with technical assessments	38%

n employers=323

SKILLS-BASED HIRING OFFERS ONE MORE BIG ADVANTAGE:

IT HELPS EMPLOYERS INCREASE THE ETHNIC DIVERSITY OF THEIR TALENT—THOUGH MORE PROGRESS IS NEEDED ON GENDER DIVERSITY

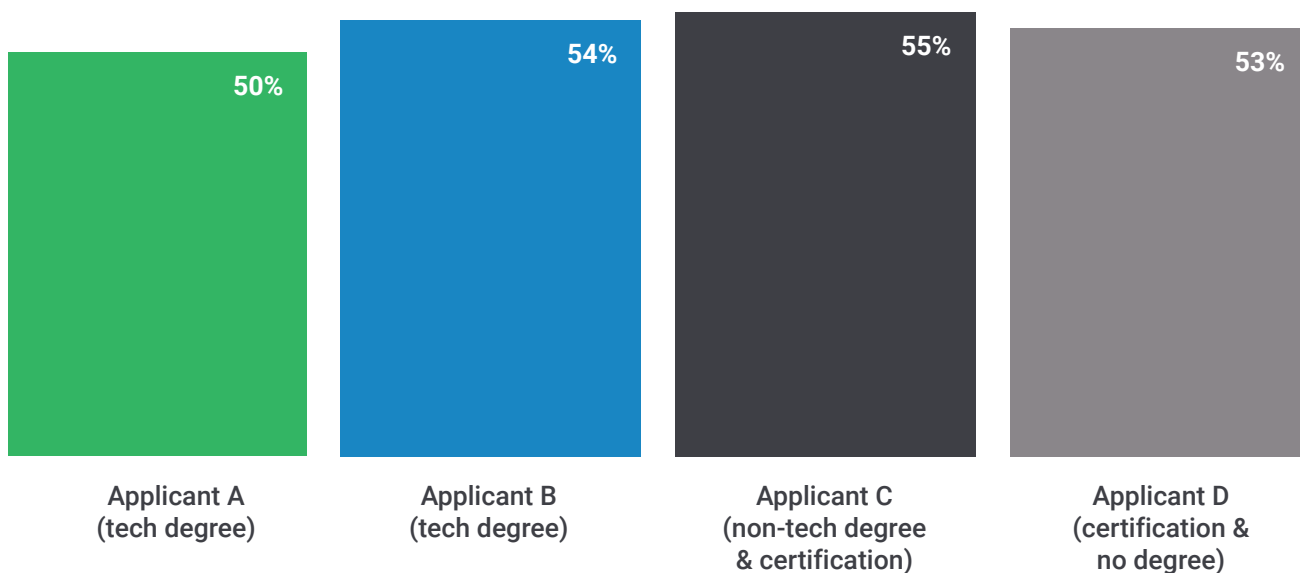# TECHNICAL CERTIFICATION AS A SCREENING TOOL OFFSETS DEGREE-BASED BIAS

44%

OF EMPLOYERS REQUIRE CANDIDATES TO HOLD TECHNICAL CERTIFICATIONS TO BE CONSIDERED FOR ENTRY-LEVEL ROLES

Replacing degree and past work experience with certification as a screening tool also improves the likelihood of hiring individuals who are currently underrepresented in tech roles. Currently, 44% of employers require candidates to hold technical certifications to be considered for entry-level roles.

To better understand their hiring behaviors, we asked employers to evaluate a set of randomly assigned mock CVs with a mix of degrees and technical certifications. Results showed no statistically significant difference in the likelihood that different candidates would be offered an interview, regardless of their education or degree background. (Fig. 25)
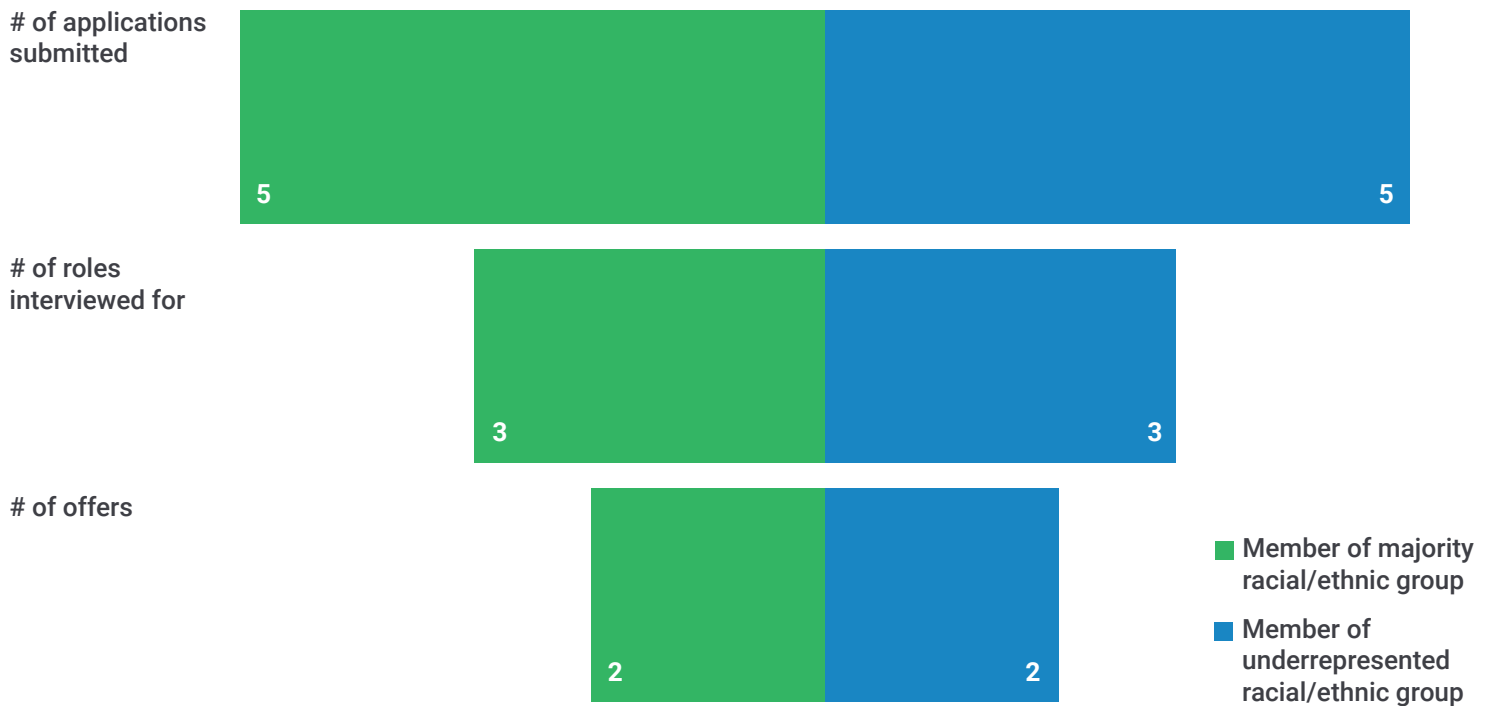
FIGURE 25
EMPLOYERS VIEW APPLICANTS WITH TECH CERTIFICATIONS AS FAVORABLY AS THOSE WITH TECH DEGREES
Likelihood of employer to offer interview after reviewing CV

Applicant A (tech degree)	Applicant B (tech degree)	Applicant C (non-tech degree & certification)	Applicant D (certification & no degree)
50%	54%	55%	53%

n employers=1,325, from which n employers that evaluated applicant A=675, applicant B=667, applicant C=664, applicant D=644

TECHNICAL CERTIFICATIONS CAN HELP EQUALIZE ACROSS ETHNICITIES

When comparing the hiring experiences (from application to interviews to job offers) of people with certifications from underrepresented groups to individuals not from these groups, certifications serve to help equalize across ethnicities. Candidates from underrepresented groups without certifications or STEM degrees gained one interview and one offer for every five applications, whereas those from majority ethnic groups saw the same results with only four applications. With certifications, both groups perform the same. (Fig. 26)

CERTIFICATIONS HAVE A LEVELING EFFECT FOR UNDERREPRESENTED RACIAL AND ETHNIC GROUPS

# of applications submitted — 5 / 5

# of roles interviewed for — 3 / 3

# of offers — 2 / 2

Legend:
- Member of majority racial/ethnic group
- Member of underrepresented racial/ethnic group

Note: individuals with certifications may also have degrees; values represent median of survey responses.
n member of majority group with certifications=899, n member of underrepresented group with certifications=152

32

TECHNICAL CERTIFICATIONS ARE LESS OF AN EQUALIZER FOR WOMEN

Certifications level the playing field for women as well, at least in the initial phase of the hiring process. When certifications form part of the evaluation process, men have only a slightly higher conversion rate from application to interview than women (80% for men, compared to 75% for women), and a slightly higher overall conversion rate from application to offer (60% for men, compared to 50% for women). (Fig. 27)

Strikingly, however, we found that men without certifications had a higher conversion rate from interview to offer than women with certifications—100% versus 66%. This may speak to a bias that still exists in the interview process. Our conclusion: while certifications function as an equalizer during the initial hiring process, more work needs to be done to dismantle biases in the interview process.

In addition, men with and without certifications apply to more positions, pointing to a need to increase the number of women applying for open roles.

FIGURE 27
GENDER BIAS PERSISTS DESPITE THE LEVELING EFFECTS OF CERTIFICATIONS
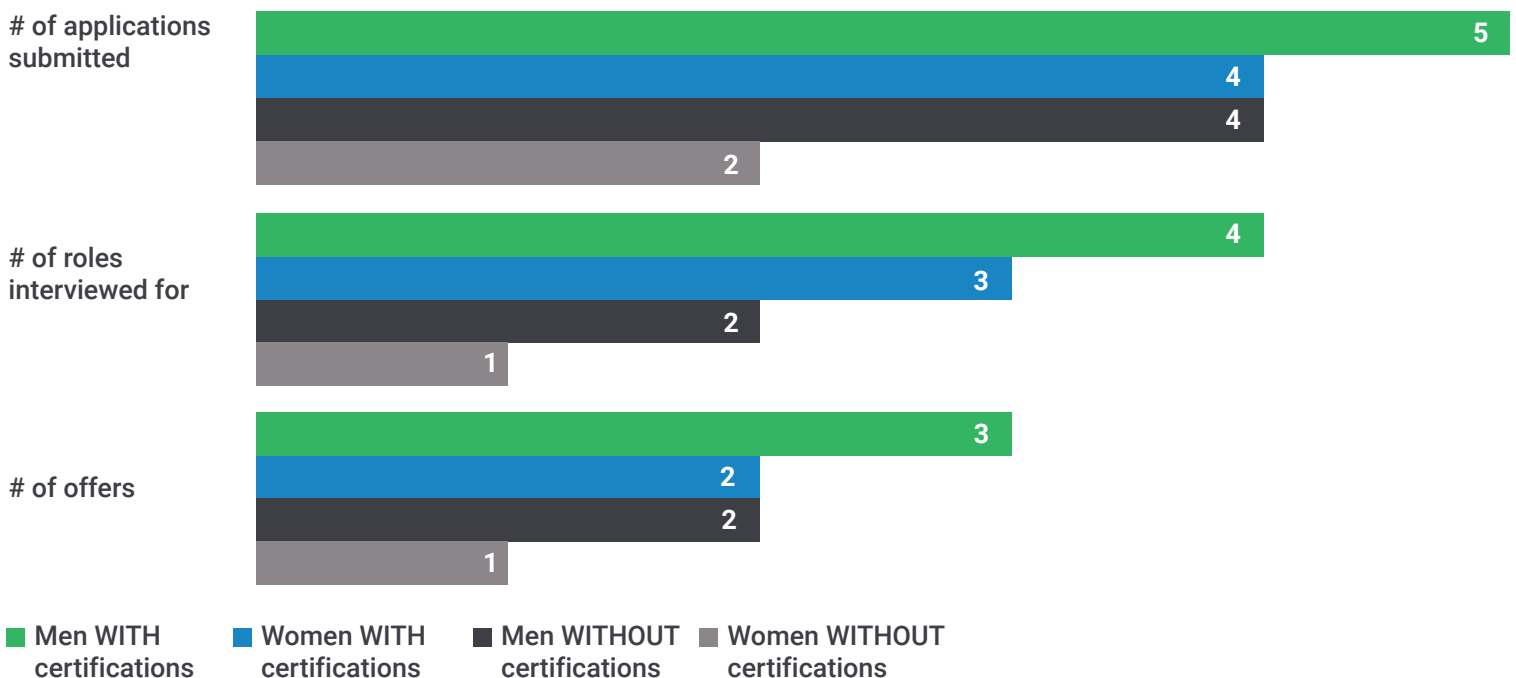
# of applications submitted
- Men WITH certifications: 5
- Women WITH certifications: 4
- Men WITHOUT certifications: 4
- Women WITHOUT certifications: 2

# of roles interviewed for
- Men WITH certifications: 4
- Women WITH certifications: 3
- Men WITHOUT certifications: 2
- Women WITHOUT certifications: 1

# of offers
- Men WITH certifications: 3
- Women WITH certifications: 2
- Men WITHOUT certifications: 2
- Women WITHOUT certifications: 1

■ Men WITH certifications ■ Women WITH certifications ■ Men WITHOUT certifications ■ Women WITHOUT certifications

Note: individuals with certifications may also have degrees. n men with certifications=772, n women with certifications=279, n men without certifications=561, n women without certifications=506

TECHNICAL ASSESSMENTS: ANOTHER TOOL FOR LEVELING THE PLAYING FIELD

Our research shows that technical assessments can level the playing field for applicants with and without a technical degree. To evaluate applicants' skills, around 75% of employers include a technical assessment and about 80% include a technical interview in their hiring process.

Of those employers that include a technical assessment, the types vary: 78% include a case study, and 71% include a coding challenge. (Fig. 28) And building these skills appears to be critical to success for entry-level tech candidates, given that 38% of those seeking tech roles were not hired because they lacked the technical skills required by the employer.
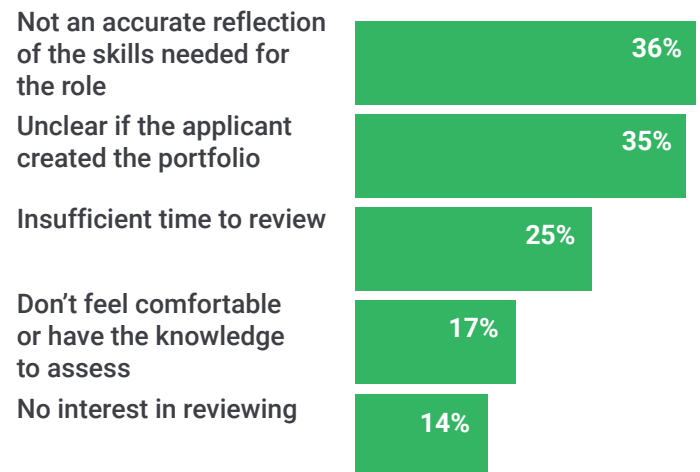
On the other hand, responses to our mock CVs showed that portfolio screenings have less of an impact on an employer's hiring decision. Only 38% of surveyed employers include a portfolio screening in their evaluation process due to concerns such as whether the candidate themselves actually created the portfolio. (Fig. 29) However, a CV with a poor-quality portfolio hurt a candidate's chances of being hired, compared to a candidate submitting a CV without a portfolio.

FIGURE 28
EMPLOYERS USE VARIOUS TYPES OF TECHNICAL ASSESSMENTS

% of respondents

Case studies	78%
Coding challenges	71%
Portfolio review	38%
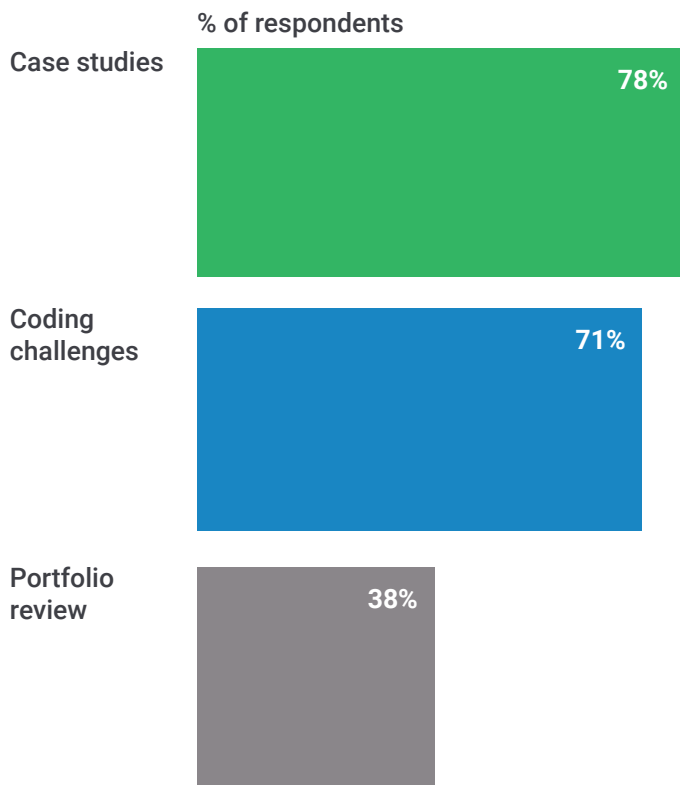
n employers=1,325

FIGURE 29
REASONS EMPLOYERS DO NOT INCLUDE A PORTFOLIO SCREENING IN THE ROLE HIRING PROCESS

|	
Not an accurate reflection of the skills needed for the role	36%
Unclear if the applicant created the portfolio	35%
Insufficient time to review	25%
Don't feel comfortable or have the knowledge to assess	17%
No interest in reviewing	14%

n employers=828

IT'S NOT JUST TECHNICAL SKILLS

Interestingly, many employers have also added behavioral skill requirements for their entry-level tech hires over the past three years, with 40% adding requirements and only 7% decreasing them. Employers cited a range of behavioral skills that they require, including communication skills, team work, problem solving, and creativity. (Fig. 30)

FIGURE 30
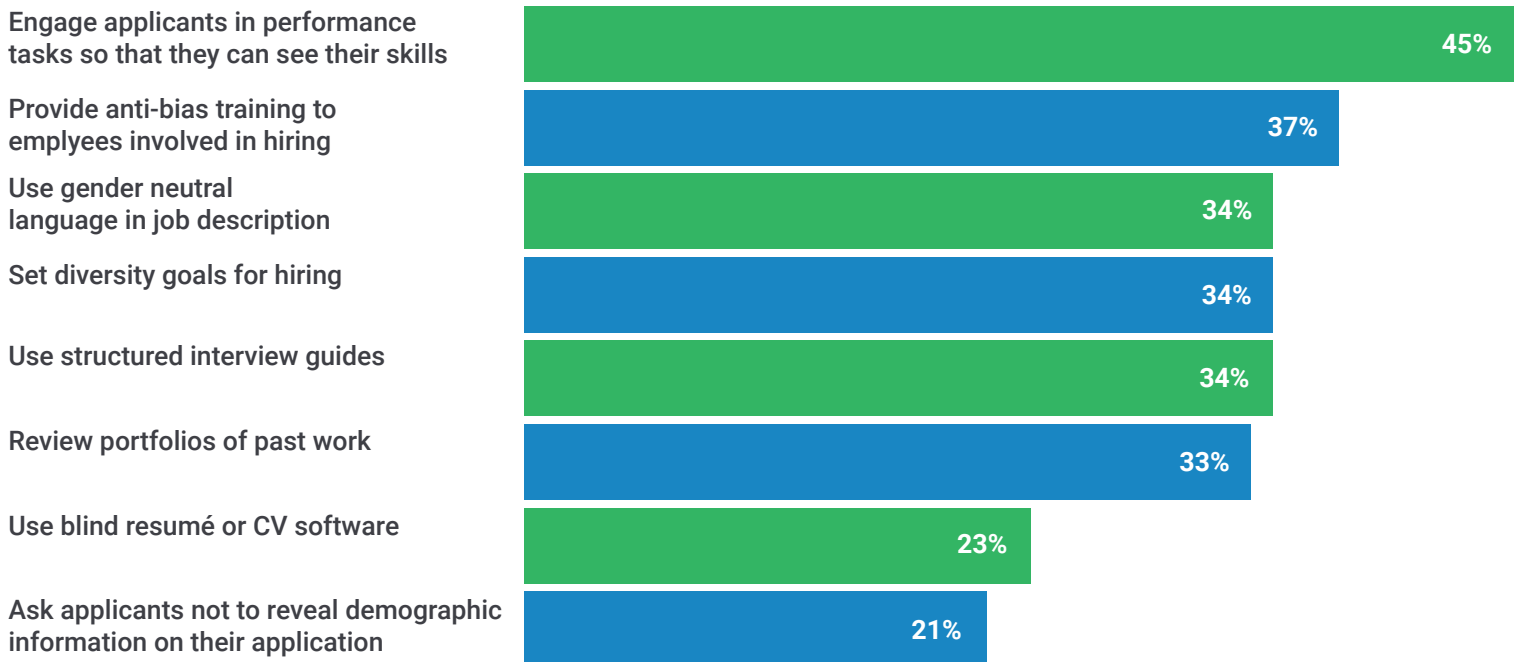**EMPLOYERS REQUIRE MANY TYPES OF BEHAVIORAL SKILLS**

Skill	Percentage
Teamwork	72%
Problem solving	70%
Communication	64%
Creativity	52%
Detail orientation	44%
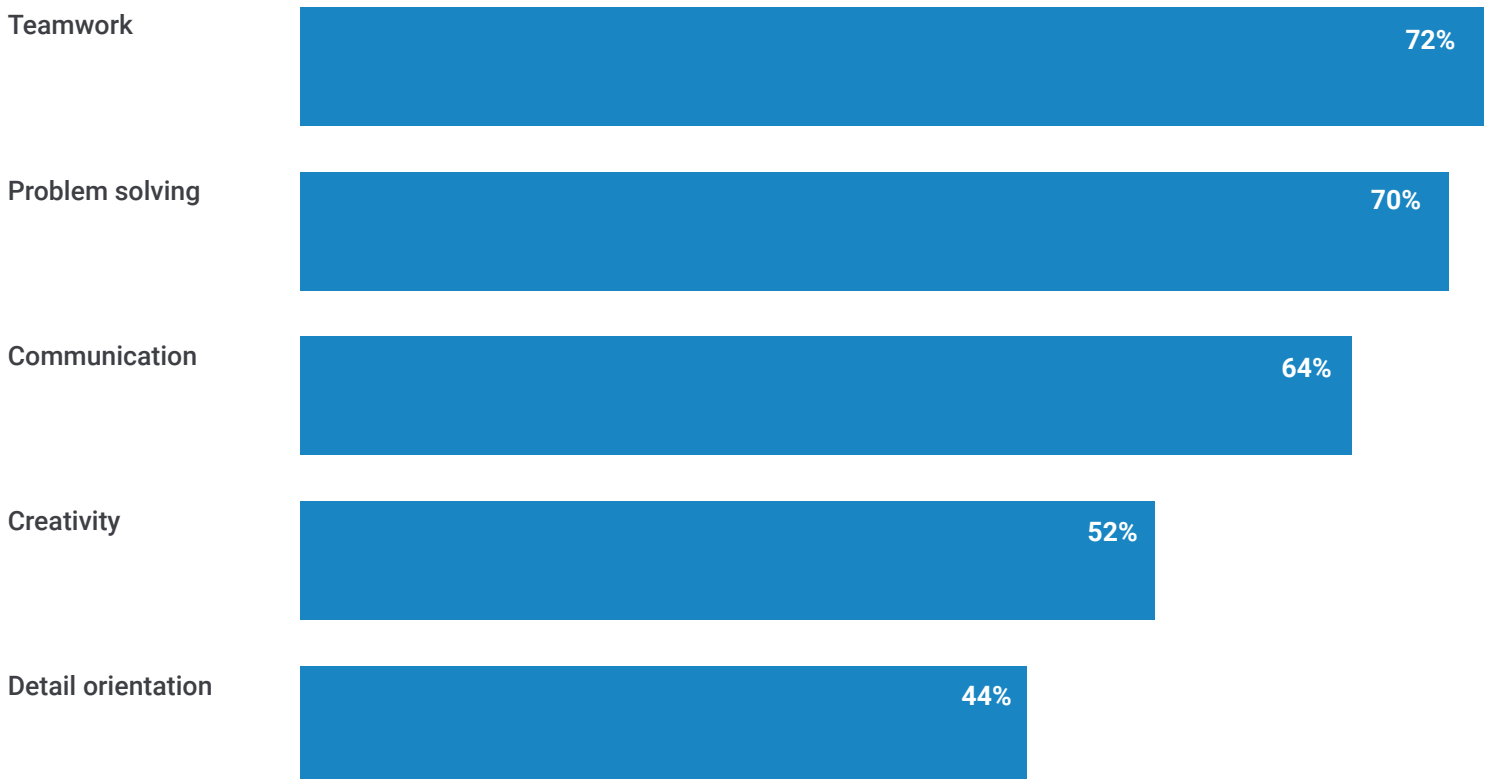
n employers=1,325

A FOCUS ON INCLUSIVITY

Companies that are already adapting their hiring processes are making a variety of important additional interventions to ensure they hit their inclusivity goals. (Fig. 31)

FIGURE 31
**COMPANIES ARE ADAPTING THEIR HIRING PROCESSES TO BE MORE INCLUSIVE**

Engage applicants in performance tasks so that they can see their skills	45%
Provide anti-bias training to emplyees involved in hiring	37%
Use gender neutral language in job description	34%
Set diversity goals for hiring	34%
Use structured interview guides	34%
Review portfolios of past work	33%
Use blind resumé or CV software	23%
Ask applicants not to reveal demographic information on their application	21%

n employers=1,325

THE CASE FOR MORE DIVERSITY AMONG RECRUITERS AS WELL

The diversity of those who evaluate applications is also a crucial consideration for employers looking to broaden their candidate pool. The social and educational background of the person evaluating applications, it appears, has implications for who they ultimately choose to hire.

In our survey, employers with a university degree were twice as likely to say they would be open to hiring a candidate with a university degree than those employers with a high school diploma. Specifically, 52% of employer respondents with a trade school degree were likely to hire a candidate with a university degree, and 29% of employer respondents with a high school diploma were likely to hire a candidate with a university degree. (Fig. 32) Evaluators with a high school education were slightly more likely to interview applicants without a tech degree.

FIGURE 32
EMPLOYERS WITH DEGREES ARE MORE LIKELY TO BE OPEN TO HIRING CANDIDATES WITH DEGREES

College degree	64%
Trade school	52%
High school	29%
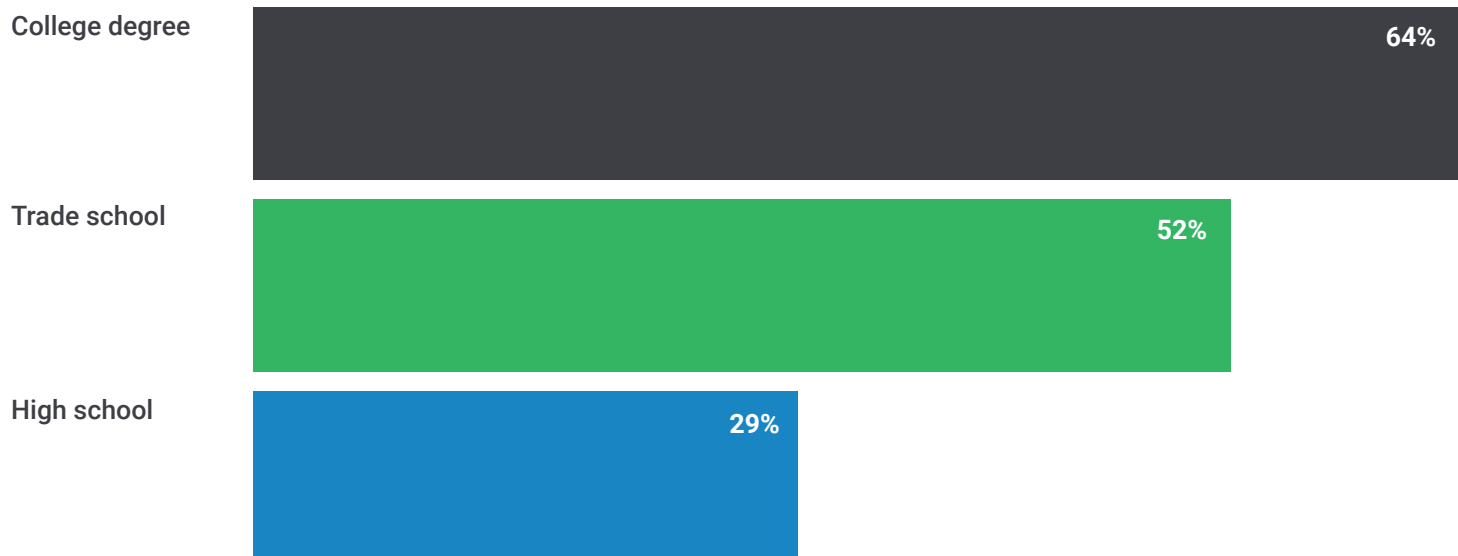
n employers with college degree=995, n employers with trade school=160,
n employers with high school or less=170

INGREDIENTS FOR MAKING SKILLS-BASED HIRING WORK

The business case, established in our survey, for radically rethinking work- and education-based barriers to entry-level hiring is clear. So, what's preventing the majority of companies from emulating the pioneers and moving boldly to this new paradigm? The human tendency to cling to business-as-usual is one reason. As economist John Maynard Keynes once observed: "The difficulty lies not so much in developing new ideas as in escaping from old ones."

The second reason is this: despite Keynes insistence that "developing new ideas" is not the real issue, it's not so easy to figure out how to make truly new approaches work in practice. At Generation, we are convinced that turning skills-based hiring into a broad global movement will require continued progress on the hard problem of pinpointing exactly what it takes to get this right.

We don't claim to have the definitive recipe. No one does. But to make a start on how best to advance this new way of hiring, we have supplemented the findings from our survey with interviews that capture the experience of several companies that have chosen to make the shift, as well as insights from a few tech-hiring industry professionals.

Think of what follows as an initial list of critical ingredients. To determine how best to mix and season those ingredients, and in precisely what sequence, we will need to journey together with innovative employers that are ready to step forward and test these ideas, and others, in their own real-world hiring kitchens—and are then willing to share what they learn, positive as well as negative. We need to understand how specific techniques may need to be adjusted to serve different global contexts and sectors.

What's certain is that only by adopting this kind of open, exploration-minded approach will we be able to build, together, the deep talent pool the world requires for its tech-dependent future.

1. BRING BACK THE ENTRY-LEVEL JOB

AT THE START OF THE HIRING FUNNEL, REMOVE WORK EXPERIENCE AND DEGREE REQUIREMENTS FROM SCREENING. INSTEAD, USE CERTIFICATIONS AND OTHER SKILLS INDICATORS TO CAPTURE THE UPSIDE—MORE CANDIDATES, GREATER DIVERSITY, COMPARABLE PERFORMANCE

Our survey results, as we have seen, demonstrate that employers who stop insisting that candidates for entry-level jobs have work experience and degrees will gain access to a higher volume of applications. But that's not all.

First, there's a cost saving. Our survey found that employers who introduced additional degree and work experience requirements in pursuit of efficiency actually ended up spending 13% more on recruiting entry-level talent than those who chose to remove some requirements. In other words, redefining requirements to open the funnel pays off.

Second, you end up with a more diverse workforce, which adds value in a variety of ways.

Consider the experience of financial services company Itaú Unibanco. This Brazilian giant decided to open up entry-level requirements to help grow the size of its tech team by 30% in just two years. According to Erica Masiero Nering, an Itaú human resources manager and head of tech recruiting, moving beyond considering university graduates had no effect on on-the-job performance. But doing so, she says, "really increased our diversity—racial diversity, the number of women, and the number of team members with disabilities. We know if we don't have a diverse team, we won't be able to serve our clients well."

To ensure these non-traditional applicants are capable of performing well in entry-level tech roles, most employers place more emphasis on alternative screening methods when they remove work experience and degree requirements.

Technical certification is not a novel screening tool. Almost half of employers currently require certifications—credentials that demonstrate skills competency with specific tools and platforms—from entry-level tech applicants. Encouragingly, our survey confirms that this group is as likely to hire applicants with only a tech certification as it is to bring on board candidates with traditional degrees.

But our pioneering minority of employers have gone beyond treating certifications as an equal alternative to degree requirements. They aim to use them to *replace* degree requirements entirely for entry-level tech roles.

For these employers, role-relevant certifications from trusted, industry-recognized names like Microsoft, Amazon Web Services, Google, and Cisco, are a better signal that entry-level tech applicants have already demonstrated the appropriate skills and have invested the requisite learning hours. Certifications have unique digital fingerprints and can be validated through the training provider.

Unfortunately, though our survey results showed that technical certifications open doors for more diverse, capable entry-level tech talent, we also discovered that such certifications lose their equalizing power for women, once they reach the interview stage of the hiring process.

2. TAKE A SKILLS-BASED APPROACH

DURING THE HIRING PROCESS, USE TECHNICAL ASSESSMENTS TO ENSURE APPLICANTS HAVE THE NECESSARY SKILLS FOR THE JOB

Employers who successfully shift their focus away from education and work history, our survey and interviews found, still need a tangible way to verify that potential hires have the skills their open jobs require. The basic answer: rely far more on methods that give entry-level applicants a chance to demonstrate their relevant skills. These may include technical assessments and technical interviews. However, ensuring these processes are efficient—while reaping the benefits of greater inclusivity without compromising quality—can take different paths, depending on the company and industry.

The use of technical assessments to test the skill of applicants for entry-level tech roles is widespread—75% of the employers we surveyed use them in this way. They typically take the form of case studies and coding challenges. Applicants either complete such assessments prior to meeting with members of the hiring team, or encounter them during subsequent technical interviews.

While we found much commonality in the steps used by employers to screen candidates, the main differences were in the order and emphasis. Employers typically used a mix

GENERATION'S EXPERIENCE

In Generation's programs around the world, we've seen how people without degrees, STEM backgrounds, or work experience can be successful candidates for entry-level tech roles, allowing companies to fill vacant spots more quickly while also introducing more diversity into their teams.

Across our tech graduates, the majority (55%) do not have a university degree—and those who do, typically do not have a science, technology, or math-related degree. Within 180 days of program completion, 79% of Generation graduates get placed into a job. In 2022 alone, more than 10,000 learners graduated from our tech programs—49% were women of whom more than one-third supported dependents. The majority were from underrepresented communities in their home countries.

Opening up these opportunities to a more diverse set of candidates is not just good for employers who need talent. Tech jobs have some of the best long-term outcomes for Generation graduates. Looking at tech alumni two to six years post-Generation, 86% continue to be employed in tech work, 46% were promoted, and 64% can save for the future—savings they use for housing, education, healthcare, and other critical investments that can transform their lives and those of their families.

of resume and cover letter screening, technical interview, technical assessment, portfolio review, behavioral interview, and reference checks. But across the board, employers said they thought the technical assessment itself was the most difficult step for them to implement.

One way to boost the efficiency of such assessments, we found, is for employers to rely on reputable third-party assessment and interviewing providers, such as CodeSignal and Karat, which automate screening without

the need for continuous intervention from hiring teams. These solutions commonly rotate through large question sets and other anti-cheating mechanisms to ensure rapid, quality skill screening—and thus avoid depending solely on work experience or degree requirements. Case in point: hundreds of thousands of individuals take CodeSignal assessments each year and they have found no correlation between education level and assessment score. The explosion of artificial intelligence tools is adding a new layer of complexity as these providers race to stay ahead of a fast-changing game. Still, assessments are a good first step for testing skills, particularly if followed by technical interviews.

Hiring managers can specify the type of skills they want to assess as well as the minimum score for successful candidates. To access the test, applicants can either be invited to log onto the assessment platform, or the service can be integrated into existing hiring management systems to automatically send assessment links at the right moment in the hiring process. An automatic grading system evaluates their performance on various tasks and challenges, and their scores are fed back to the hiring managers.

Akhilesh Nair currently sits at the helm of the team that leads global human resources digital transformation for NTT Ltd. Nair says that NTT, which is just introducing skills-based assessments for its entry-level tech hiring process, has found that these are best used right at the start of the hiring process to quickly identify whether candidates have the necessary skills for the job. Currently, most tech assessments cater to software industry roles like Java and Python developers, so for infrastructure or hardware engineering companies, it is important to adopt a hybrid approach of certifications and customized skills assessments to select the right people with the right skills in the job. With new technology developing at such a rapid pace, Nair and others recommend modifying question sets, selection criteria, and/or developing new skills based assessments to successfully fill the tech roles you're looking to hire for.

3. EMBRACE HARD SKILLS AND BEHAVIORAL SKILLS

THROUGHOUT THE PROCESS, KEEP PAYING ATTENTION TO BEHAVIORAL SKILLS AS WELL AS TECHNICAL CAPABILITIES

Our survey revealed a wide range of non-technical skills that employers are looking for in their entry-level tech hires. Teamwork, communication, problem solving, and creativity were all important criteria for the majority of hiring employers. Fausto Diaz Ballinas, head of Global Transactions Banking Tech in North America for Banco Santander, is among this growing crowd of talent managers who believe that tech skills alone are not sufficient to ensure a successful hire. He says: "We used to think we needed only tech skills, but now we are also looking for bilingual and communication skills." Fausto uses non-technical interviews to evaluate entry-level tech applicants' other skills, their eagerness to learn and grow, and the likelihood they will fit well within the existing team and culture.

As part of adopting a broader lens, some respondents to our survey and interviews stressed the benefit of pushing hiring teams to focus on matching specific talent to specific *roles* rather than merely assessing raw skills in a vacuum.

However you do it, there is no doubt that these behavioral skills are hard to recruit for and assess. But since employers say they are increasingly important, it's incumbent upon all of us to keep such behavioral skills as part of the process—and keep getting better at assessing them.

4. RETHINK HIRING TEAMS

DIVERSIFY YOUR RECRUITERS TO REDUCE TACIT BIAS AND BRING IN A WIDER RANGE OF TALENT

Despite the push for more automation, including in recruitment and assessment, in the end it's people who hire people. Our survey underscored that reality, by revealing that a candidate's likelihood of being hired can be influenced by the social background of the person evaluating their application. Employer respondents with a university degree were most likely to hire university-qualified candidates, and significantly less likely to select those with trade school degrees or high school qualifications. To offset such bias, companies should

strive to assemble more diverse tech hiring teams that include people from underrepresented groups with varying educational, social, and cultural backgrounds. In addition, we found that employers who value greater diversity are offering hiring teams anti-bias training, foregrounding diversity goals in the hiring process, and using structured interview guides to reduce the likelihood of hidden bias creeping into decision-making.

A HIRING REVOLUTION

These initial learnings only scratch the surface of what's possible. But we hope they at least offer tech employers—which is to say *all employers*—a convincing start to building a new solution. To accelerate the transition away from the prevailing hiring processes for entry-level tech talent, we must continue exploring and iterating on a range of skills-based approaches, digging into the details of how to use different tools and hone best practice.

In support of such learning, Generation plans to assemble a coalition of employers from across the world that want to make the kinds of changes our research calls for. We will test these ideas together, and share the results broadly to help us arrive at durable solutions that can be applied across sectors and around the globe.

Replacing a century-old model isn't the work of a few months or even a year or two. What's clear, however, is that a revolution in tech hiring is essential, and it needs to start now.

METHODOLOGY & DEFINITIONS

The findings in this report are drawn from a survey commissioned by Generation that was in the field from November 4, 2022, to January 9, 2023. The study included employed people (aged 18 and over), unemployed people (aged 18 and over), and hiring and technical managers at employers.

The survey drew 4,023 responses from employed and unemployed people, and 1,325 responses from employers across Brazil, Canada, France, Germany, India, Mexico, the United Kingdom, and the United States. The research reflects the views and opinions of online populations in these countries, and the surveys of the unemployed and employed are representative of their specific populations by age, gender, household income or socioeconomic level, and region. Responses collected from the United States were also representative of the population's ethnicity proportions.

Confidence intervals were used to assess the statistical significance of the findings. In this study, we used a 95% level of confidence.

CURRICULUM VITAE AND PORTFOLIO TESTING
To understand the natural biases that exist in the tech space, the evolving job requirements in tech roles, and how employers screen CVs for tech roles, the survey for all employers included an Employers & Managers A/B Testing exercise to test educational credentials and portfolios from two random applicants selected from a pool of four different candidates who were applying for a Java Developer role.

These profiles were the following:
1. Individual with a degree in a tech-related field and a high-quality portfolio
2. Individual with a degree in a tech-related field and a low-quality portfolio

3. Individual with a degree in a non-tech related field, relevant certifications, and a high-quality portfolio
4. Individual without a degree, with a bootcamp experience, relevant certifications, and a high-quality portfolio

The exercise consisted of employers evaluating a candidate's CV, and then they were asked to review the candidate's portfolio to register if it changed their decision to interview, and finally, they compared the applicant with another whose credentials were different, making sure every time CVs and portfolios were rotated to mitigate order bias.

REPORT TERMINOLOGY

UNDERREPRESENTED COMMUNITIES
Figures on underrepresented communities are drawn from survey respondents' choice of ethnicity or, in France and India, self-identification as a member of an underrepresented community in their country (racial or ethnic identification).

COUNTRY INCOME
Groupings by country income are based on The World Bank definitions of four groups of global economies (low, lower-middle, upper-middle, and high) based on annual GNI per capita. These definitions are updated each year, and in the 2022-23 classifications for surveyed countries, Brazil, India, and Mexico fall in the middle-income groups, and France, Germany, the United Kingdom, and the United States fall in the high-income group.

RESPONDENT TYPES
This report adopts specific terms for various groups of people: Unemployed Individuals Seeking Entry-Level Tech Roles, Unemployed Individuals Seeking Entry-Level Non-Tech Roles, Employed Individuals in Tech Roles, Hiring and Technical Managers for Tech Roles.

Respondents included the following:
Unemployed Individuals Seeking Entry-Level Tech Roles: Individuals 18+ years old, currently unemployed and seeking a job opportunity in an entry-level tech

role within either tech or non-tech companies. About a quarter of these individuals said they come from an underrepresented community. Roughly two-thirds of these respondents have an educational background in tech.
Unemployed Individuals Seeking Entry-Level Non-Tech Roles: Individuals 18+ years old and currently unemployed seeking a non-tech entry-level role. 40% of these individuals said they come from underrepresented communities.
Employed Individuals in Tech Roles: Individuals 18+ years old and within the past three years found work in an entry- or intermediate-level tech role. 37% of these individuals said they come from an underrepresented community. 59% of respondents have an educational background in tech.
Hiring and Technical Managers for Tech Roles: Individuals 18+ years old, currently employed full-time or part-time, and in positions responsible for hiring and evaluating entry- and intermediate-level tech candidates. They also must have evaluated applicants for at least three entry- or intermediate-level positions in the past year. This research included both managers who hold a position within human resources (where hiring is their primary job responsibility) and managers who work in a department separate from human resources and participate in the hiring process (not as a part of their primary job responsibility).

TECH ROLES
In this research, "tech" is defined by a list of 30 specific tech positions (see list below). The entry-level tech roles that were included are: .NET developer, C++ developer, cloud developer, cloud support, cybersecurity, data analyst, data architecture, data engineer, DevOps, digital customer support, digital marketing, front end web/junior web developer, full stack developer, information technology coordinator, manager or director, JavaScript developer, junior Java developer, junior software developer, PHP developer, product designer, product owner, Python developer, QA tester, RPA, Ruby on Rails developer, Salesforce developer, SCRUM master, software architecture, tech lead, and tech support specialist.

ACKNOWLEDGEMENTS

www.generation.org