

KLA+

Engineering Inspiration Report 2021



Introduction

As the world becomes **more data-driven, autonomous, and high tech**, the demand for engineers is at an all-time high and continues to rise.

Meanwhile, it's well documented that there is a **shortage of engineering talent**—both entering the workforce, as well as remaining in it.

The gap between the supply and demand of talent led to KLA questioning the **inspirations** and **motivations** of those who choose the engineering path.

In order to gain a better understanding of engineers' unique career path needs, KLA commissioned a survey of two groups—students and engineers—to evaluate the inspirations, motivations, and barriers they face on the path to engineering.



Students are working toward a university-level degree in a STEM field and considering engineering.



Engineers are professionals in STEM-adjacent industries who identify as engineers.



Note: Please see *Detailed methodology* at end of report for full definitions of “students” and “engineers” groups.

Through its inaugural **Engineering Inspiration Report**, KLA identified **five key themes** that are strongest among the engineering community:

Passion for engineering is strong

Whether a student or seasoned professional, the passion for engineering burns strong

Motivators are rooted in promise and purpose

While salary plays a role in attracting talent, the chance to make a positive impact on the world is a big draw

Inspiration to innovate and make an impact

Engineers are most excited to be a part of cutting-edge projects that will challenge status quo and drive change

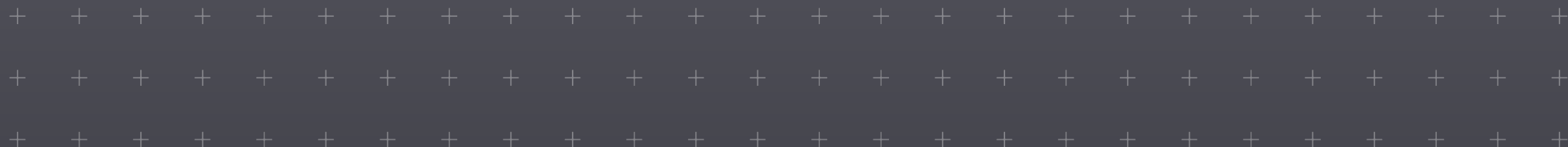
Barriers to a career in engineering including awareness and gender hurdles

Awareness of the engineering profession is down, and women are more likely to receive discouragement from entering the field

Non-technical skills are *also* required for success

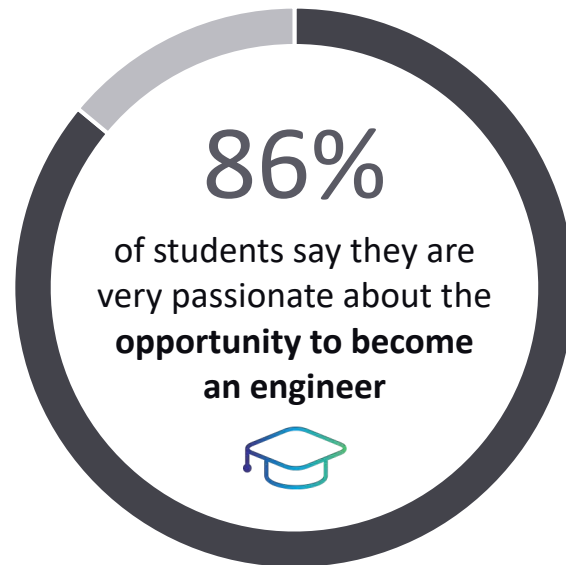
Qualities like time management and teamwork are seen as valuable to the industry but are not currently taught in degree program for over half of students

**Passion for engineering
is strong throughout the
engineering journey**

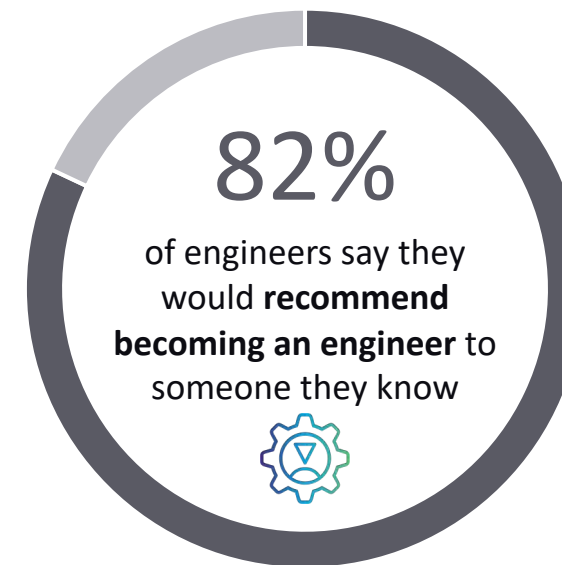


Passion starts in school and is carried throughout an engineering career

Almost all students and engineers indicate they are passionate about the chance to join the field and, in turn, would recommend their career to others. Roughly nine-in-ten students say they are very passionate about the opportunity to become an engineer, and nearly the same share of engineers say they would recommend becoming an engineer to someone they know.



Strongest for UK (94%), US (93%)



Strongest for US (93%), UK (88%), China (88%)



Q.26 How passionate are you about the opportunity to become an engineer? NET: Top 3 Box (8-10)
Base: Students: Total (N=1083), UK (N=306), US (N=301), Israel (N=74), China (N=302), Taiwan (N=100)

Q.27 How much do you agree with this statement: "I would recommend becoming an engineer to someone I know"? NET: Agree
Base: Engineers: Total (N=2278), UK (N=500), US (N=700), Israel (N=178), China (N=700), Taiwan (N=200)



Passion for engineering does not diminish as engineers continue in their career – in fact, most say their career is better than they expected

Roughly two-thirds of engineers feel just as passionate or more passionate about their job in engineering now compared to when they were studying to become an engineer. A similar proportion find engineering as a career to be better than they thought it would be before starting their first engineering job.

64%

of engineers feel **just as passionate** or **more passionate** about their job in engineering now compared to when they were studying to become an engineer

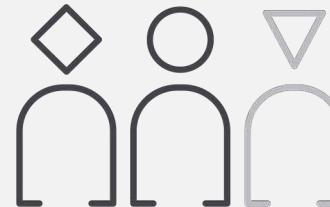


Strongest for
Israel (76%), US (70%)



66%

of engineers say engineering as a career is **better** than they thought it would be before starting their first engineering job



Strongest for
US (78%), China (75%)



Q.29 Thinking about how passionate you are to be an engineer, which of the following BEST describes you? NET: More passionate / Just as passionate
Q.28 As a career, is engineering better, worse or the same as you thought it would be before starting your first engineering job? -Better
Base: Engineers: Total (N=2278)

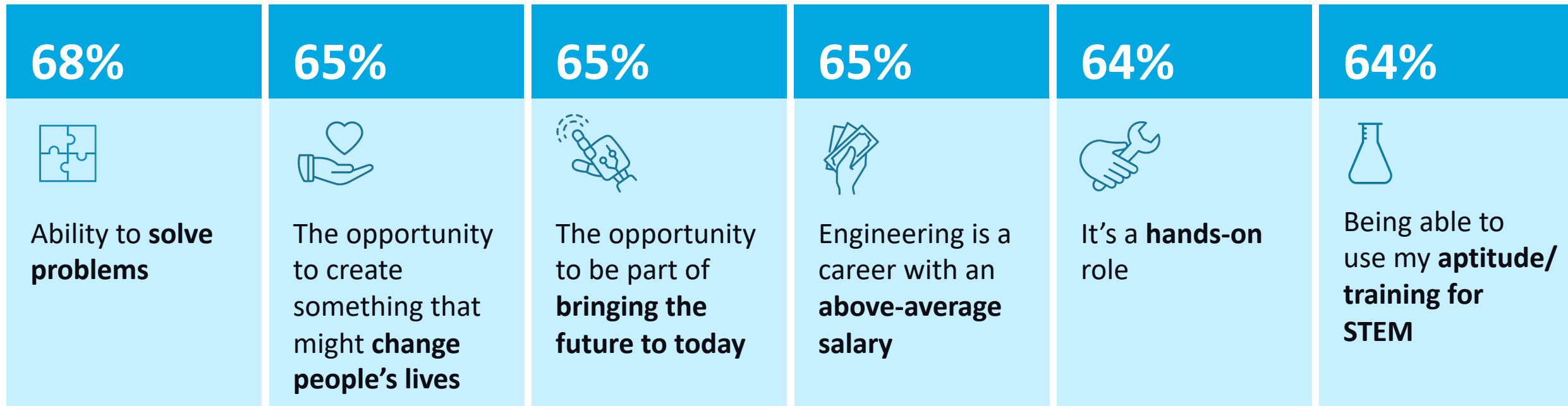
Early motivators rooted in promise and purpose from an employer



Engineers want to make an impact – they are drawn to the field by the chance to solve problems and change the world

When first introduced to engineering, around two-thirds of engineers and students were highly motivated by the ability to solve problems, the chance to change people's lives, and the opportunity to bring the future to today.

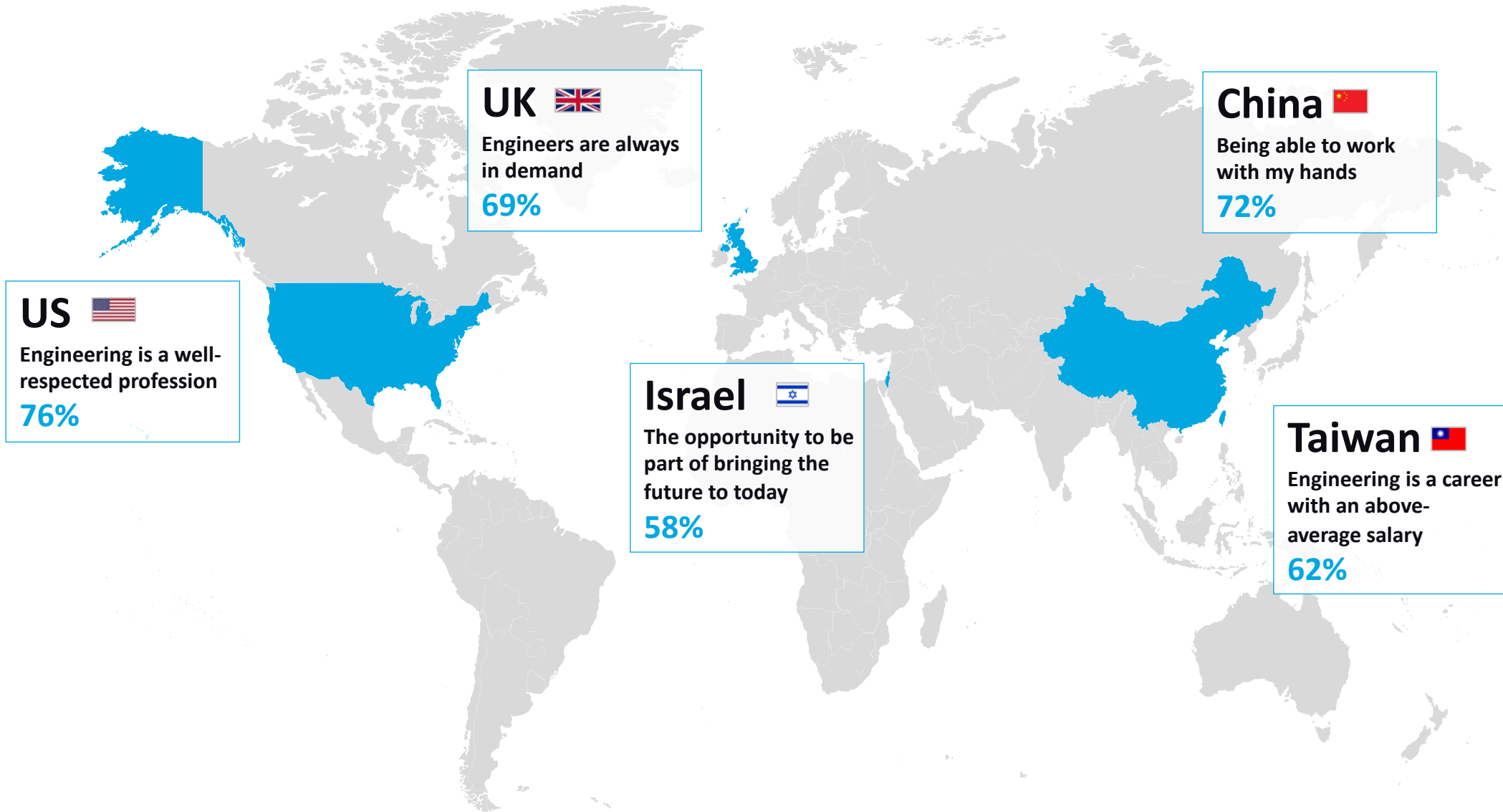
Highly motivating factors when first introduced to engineering:



Q.5 When you were first introduced to engineering, how motivating were the following, if any? NET: Top 3 Box (8-10)
Base: All Respondents: Total (N=3361)



Aside from problem solving, top motivators differ across markets





Engineers stay in the field out of love for their work

Engineers stay in their field for reasons other than money. The top two motivators are enjoying what they do and finding their work interesting, followed distantly by salary.

What motivates engineers the most to stay in engineering:

Tied #1

- I enjoy what I do (35%)
- The work is interesting (35%)

#3 The money I make (27%) →

Stronger for Taiwan (38%), Israel (35%)



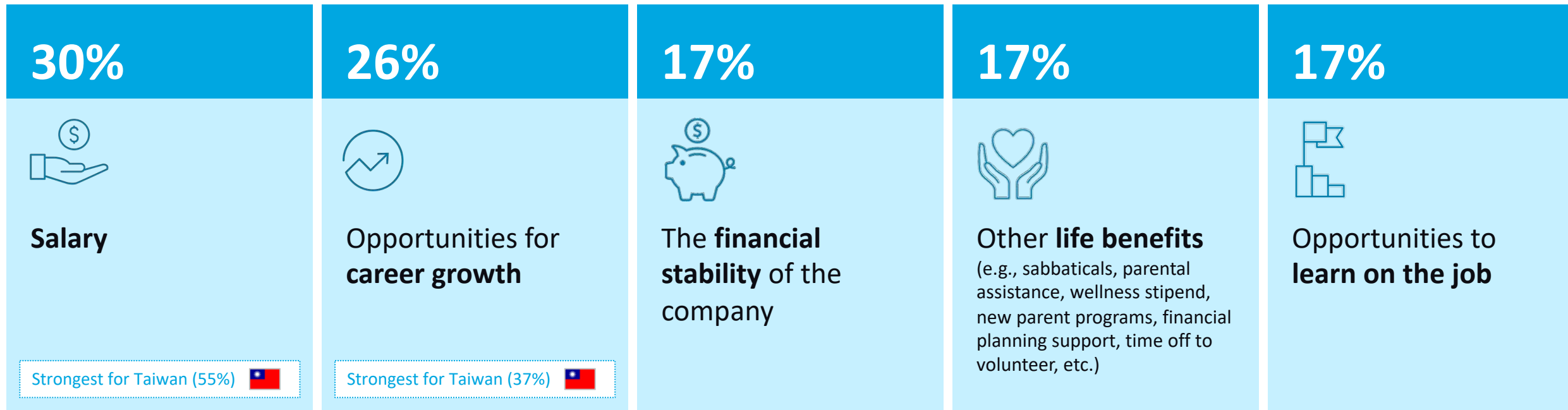
Stronger for China: I have previously created a product I am proud of and want to do that again (29% vs. 22% multi-regional average)



When choosing an employer, students and engineers are looking for a package deal

Students and engineers look for a combination of factors from potential employers, with salary and opportunities for career growth ranking at the top of the list. Of note, other life benefits are also important and outranked health benefits or other in-office benefits as a motivating factor when considering an employer.

Most motivating factors when engineers and students consider choosing an employer:



Q.23 Looking ahead to when you are choosing an employer, which, if any, of the following will be MOST motivating to you? / When choosing an employer, which, if any, of the following are MOST motivating to you? Base: All Respondents: Total (N=3361)

A successful invention is widely perceived as the biggest indicator of success in the field among both students and engineers

Leaving a mark on the industry by creating a successful product or invention is seen as a bigger indicator of success in the field than having a high salary or even a senior management role. This holds true for both engineers and students.

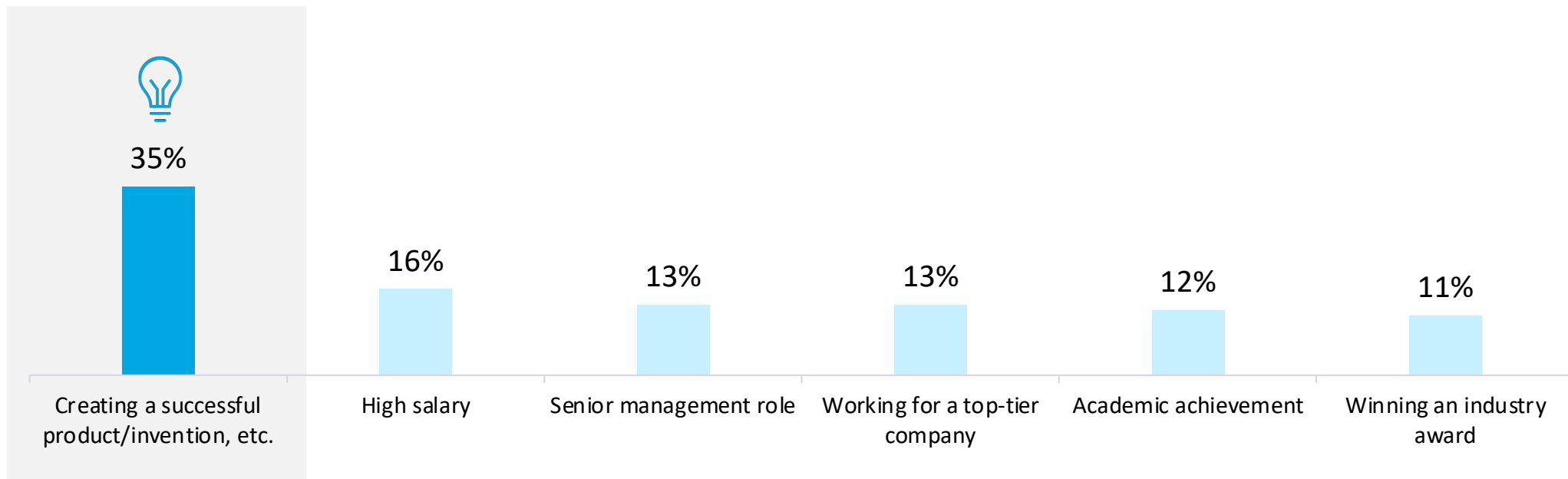
Engineers:
#1: Creating a successful product/invention (37%)
#2: High salary (15%)



Students:
#1: Creating a successful product/invention (31%)
#2: High salary (18%)



Achievements seen as the most successful:

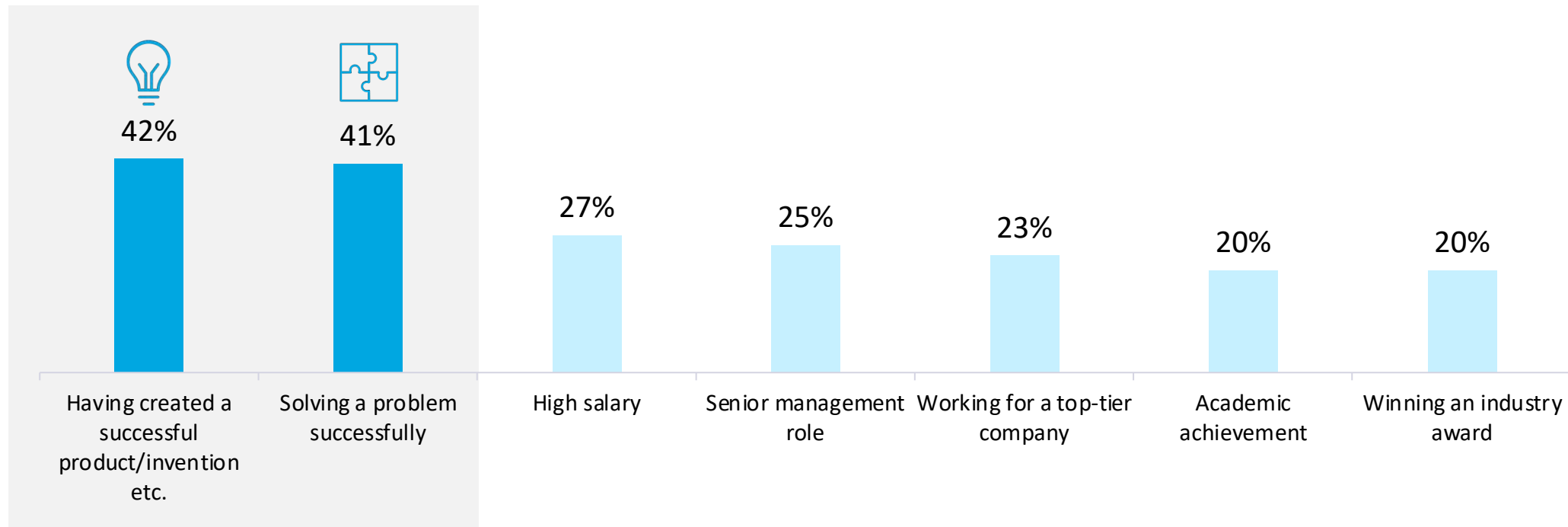


Q.21 Which, if any, of the following achievements do you think is seen as most successful in the field of engineering? Base: All Respondents: Total (N=2278)

And when it comes to their own personal definition of success, students and engineers value impact and problem solving

When evaluating the perceived success of engineers in the field, respondents cited the creation of a successful product/invention as the top indicator of success. Yet, when it comes to defining their personal success, they rank the same factor on par with successfully solving a problem; both factors rank higher than a high salary or senior management role.

Achievements by which engineers and students define personal success:



Q.22 How do you define personal success as an engineer?
Base: Engineers: Total (N=2278)

**Inspiration to innovate and
make an impact using
cutting edge technologies**

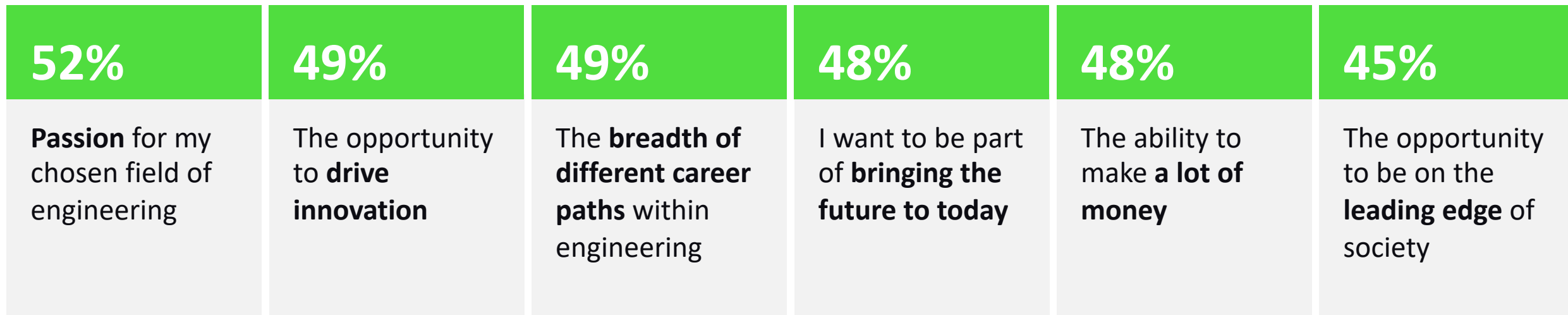




Engineers and students draw inspiration from their passion for the field and the opportunity to innovate

While working toward a career as an engineer, both students and engineers report being inspired by their passion for their chosen field as well as the promise of making an impact and being an innovator. The breadth of career paths and ability to make a lot of money are also inspiring factors.

Major sources of inspiration while working towards becoming an engineer:



Students are more motivated by the promise of a high salary (54%, vs. engineers 45%)



Q.10 To what extent did/do each of the following inspire you as you are considering and/or working towards becoming an engineer?/To what extent did each of the following inspire you as you were working towards becoming an engineer? -Major inspiration
Base: All Respondents: Total (N=3361), Engineers (N=2278), Students (N=1083)



The digital era, sustainability, and social concerns are driving students to pursue engineering and fueling engineers' passion for the field

Real-world events compel engineers and students. Digital changes, like the digital revolution and the creation of social media, are the most inspirational to engineers, particularly those focused on software. ESG causes, such as climate change and social disparity, also inspire many engineers and students.

World events and social issues inspiring careers in/passion for engineering: (NETS)



Digital (62%)

Digital revolution (i.e., the birth and use of AI, machine learning, and other technologies)

Social media being created

Strongest for Software Engineers (75%)



Sustainability (50%)

Focus on climate change

Burden of overpopulation on natural resources

Major natural disasters

Strongest for Infrastructure* Engineers (57%)



Social concerns (39%)

Social disparity issues

Disparity of resources globally

Strongest for Data Engineers (50%)

Q.30 Which, if any, of the following world events, societal changes and societal issues have inspired you to consider a career in engineering: / Which, if any, of the following world events, societal changes and societal issues have continued to inspire/reinspire your passion for engineering:

Base: All Respondents: Total (N=3361)

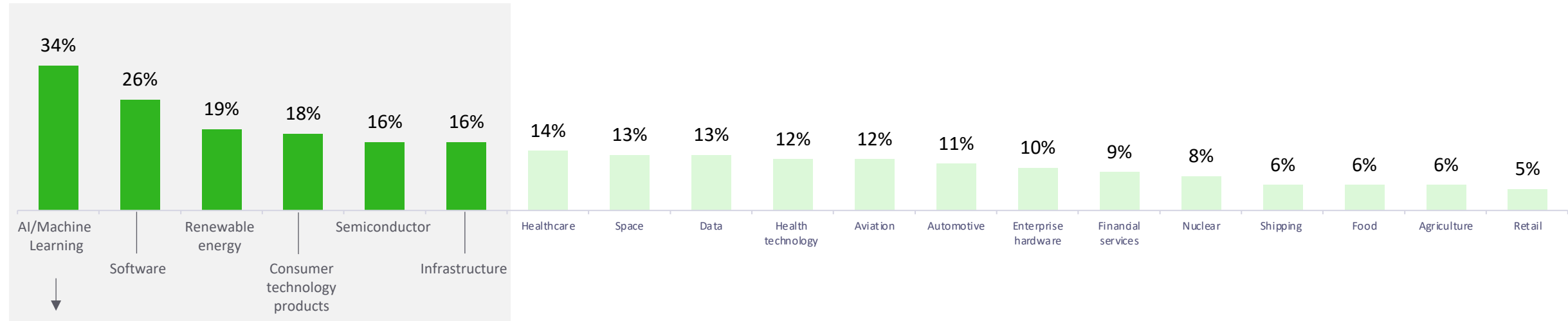
*Infrastructure engineers consists of Civil engineers, Drafting and Design engineers, and Materials engineers



AI/machine learning and software are the most exciting areas for those building engineering careers

Accordingly, regardless of where in their career an engineer is, engineers and students say they think AI/machine learning and software are the most exciting places for budding engineers to build a career, which reflects the real-world events that inspire them. Renewable energy, consumer technology products, the semiconductor industry, and infrastructure are also seen as exciting industries.

Most exciting industries in which to build an engineering career:



Strongest for
Software
Engineers (51%)

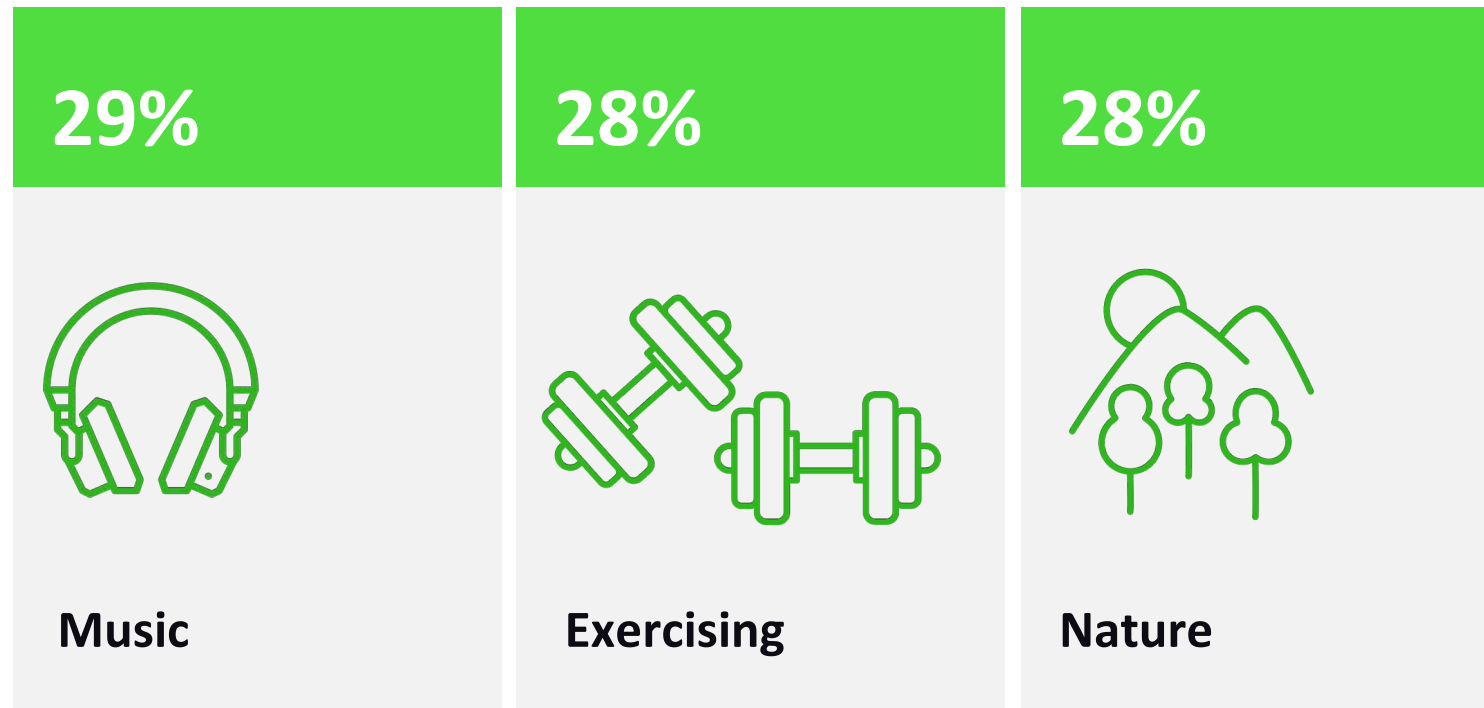
Q.24 In which of the following industries would you be MOST excited to build a career as an engineer? / In which of the following industries do you think engineering students are MOST excited about building a career as an engineer?

Base: All Respondents: Total (N=3361), Engineers (N=2278), Students (N=1083). Not showing responses 10% or under.

Engineers and students turn to solitary, reflective habits for inspiration for their work

Outside of work, engineers and students agree that music, exercising, and nature are some of the top sources from which they draw inspiration for their day-to-day work. Moments to step away from work or studies can inspire engineers in their career.

Sources of inspiration for day-to-day work:



Q.16 During your studies, where do you currently draw inspiration from for your day-to-day work? / Outside of the actual work, where do you draw inspiration from for your day-to-day work?

Base: All Respondents: Total (N=3361)

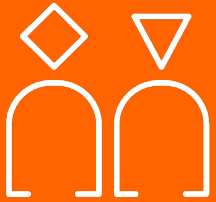
Barriers to a career in engineering including awareness and gender hurdles



Students and engineers largely learn about engineering from friends or family and decide to become an engineer in their undergraduate programs

Nearly half of students and engineers were introduced to engineering as a career path by family or friends, and an additional quarter were introduced by a teacher or professor. In terms of deciding on engineering, almost half first started thinking about it as a potential career around the time of their undergraduate degree, which is also when many ultimately decided to stick with it, indicating a potential lack of understanding about what engineering really entails before university.

Friends or family introduce idea



44%

were **first introduced** to engineering career path by **family or friends**

Introduced by Teacher/Professor: (26%)

Seriously consider and ultimately choose engineering in undergrad



45%

first consider engineering when choosing an undergrad degree or during undergrad

Compared to only 25% who decided in high school



43%

ultimately decide to pursue engineering when choosing undergrad degree or during undergrad





Q.4 Who or what introduced you to the existence of engineering as a career path? Q.1 At what point did you begin to consider engineering as a career path? Q.2 At what point, did you decide to become an engineer?
Base: All Respondents: Total (N=3361)

Most considered other careers along the path to engineering

Aside from engineering, nearly a quarter of students are still considering to become a programmer or scientist, and both engineers and students have considered but dismissed a variety of other career paths.







Alternate careers considered by students:

 <p>Programmer 25% still considering</p>	 <p>Scientist/researcher 23% still considering</p>
 <p>Healthcare practitioner 20% considered but dismissed</p>	 <p>Teacher 17% considered but dismissed</p>



Alternate careers once considered by engineers:

 <p>Teacher 19% considered but dismissed</p>	 <p>Programmer 19% considered but dismissed</p>
 <p>Scientist/researcher 19% considered but dismissed</p>	 <p>Doctor 18% considered but dismissed</p>

Q.8 What other careers, if any, did you consider but dismiss? Base: Engineers: Total (N=2278) Q.9 What other careers, if any, have you considered but dismissed, and which are you still considering? Base: Students: Total (N=1083)



The academic rigor and long path to an engineering career are top personal challenges

Top challenges in becoming an engineer:



Stress of needing to achieve academic excellence
(63%)



Time it takes to become an engineer
(62%)



Cost of education
(52%)

66% of female students say the lack of women in STEM careers is a challenge for them as they consider/pursue engineering

59% of female engineers felt challenged by the fact that STEM careers were not considered appropriate for women when they were on the path to becoming an engineer

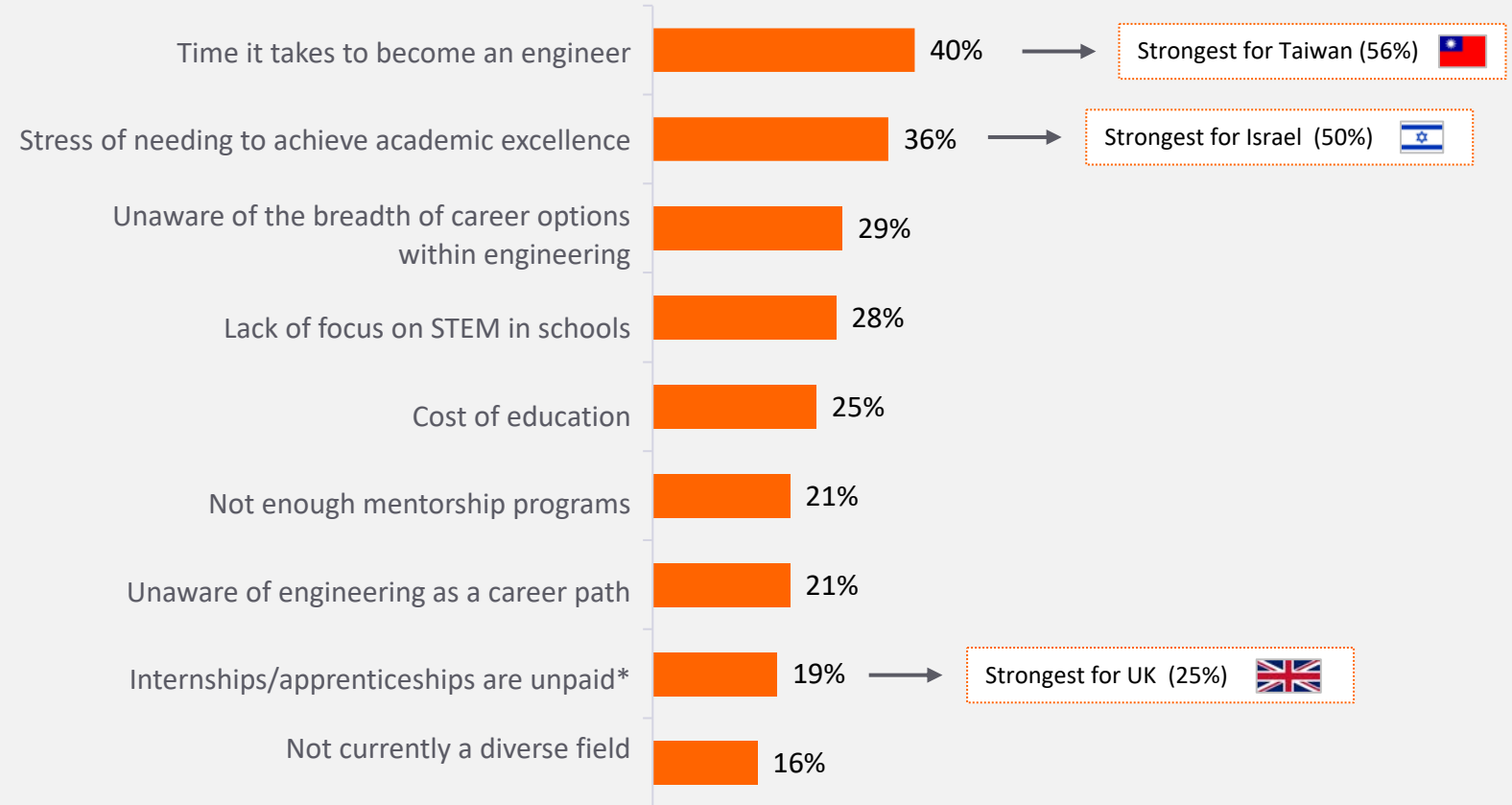
Q.13 Which, if any, of the following are challenges for you, and which are the MOST significant challenges for you as you consider/pursue becoming an engineer? / when you were on the path to becoming an engineer? -Challenges
Base: All Respondents: Total (N=3361), Students (N=1083)

Further, the perceived barriers to becoming an engineer are as follows...

In addition to being the top challenges affecting students and engineers personally, the time it takes to become an engineer and the stress of needing to achieve academic excellence are also widely seen as the top reasons engineering students and professionals think more people do not choose engineering as a career path.

In addition, a lack of awareness around career options and a lack of focus on STEM in schools are cited as likely barriers for others who don't pursue engineering.

What students and engineers see as barriers to others pursuing engineering:

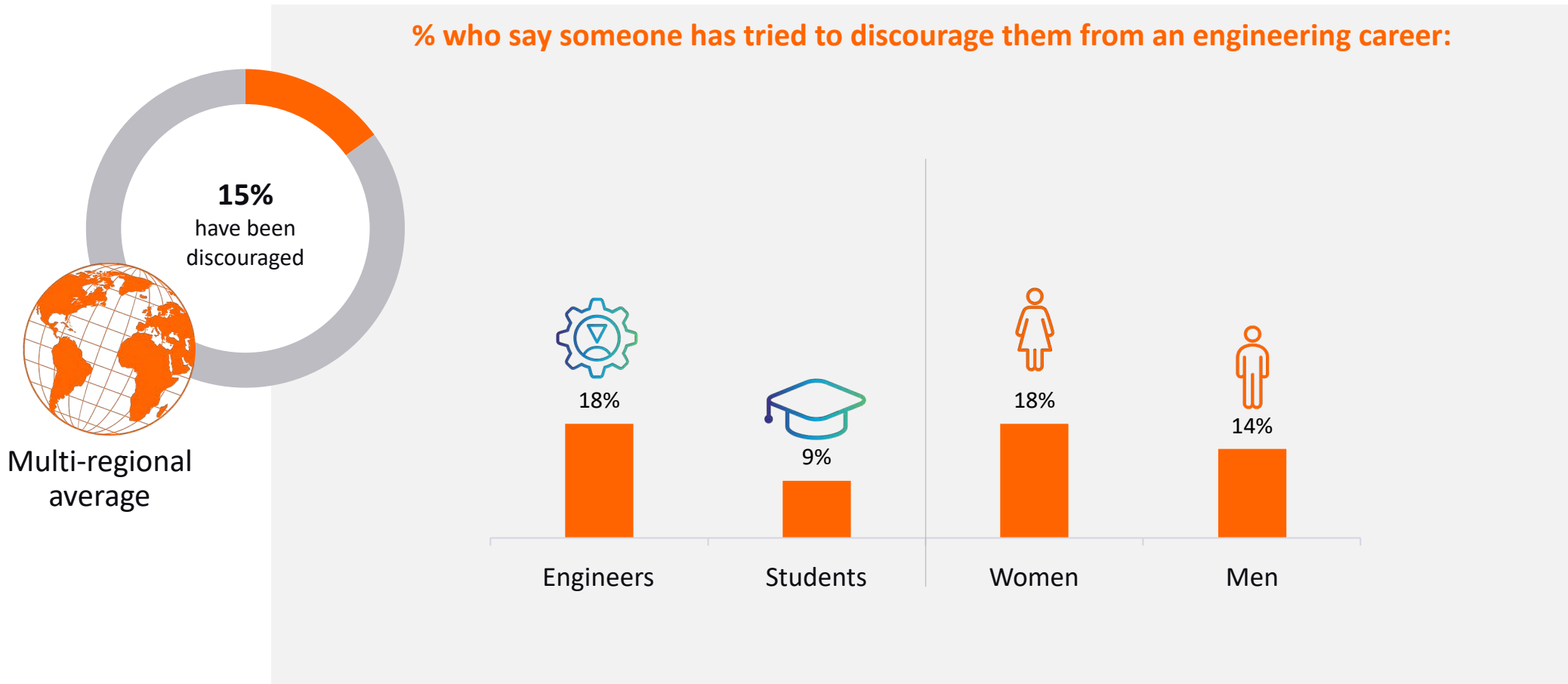


*Not shown in Israel

Q.31 Why do you think more people don't choose engineering as a career path?

Base: All Respondents: Total (N=3361)

Students are less likely than engineers to say someone has discouraged them from pursuing an engineering career, but women are more likely than men to say they've been discouraged



Q.11 Has anyone ever tried to discourage you from a career in engineering? / Did anyone ever try to discourage you from a career in engineering?

Base: All Respondents: Total (N=3361), Engineers (N=2278), Students (N=1083), Women (N=999), Men (N=2361)

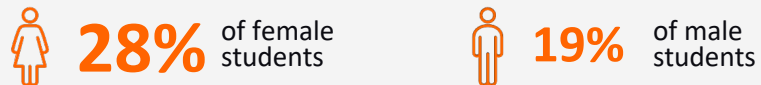
Women may lack engineering role models in their personal lives, leading them to start their engineering journeys later in life than many men

Women more likely to say:

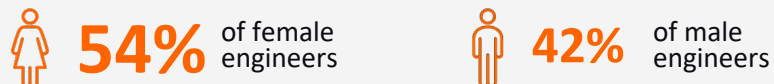
A **professor introduced them** to engineering as a career



They began considering engineering **during their undergrad degree**

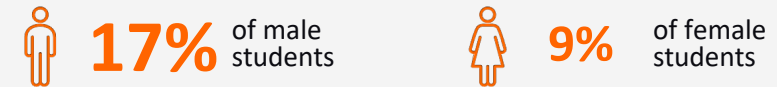


When first introduced to engineering, **the chance to break the glass ceiling** was a top motivator

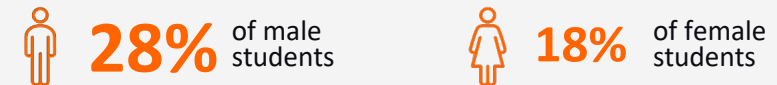


Men more likely to say:

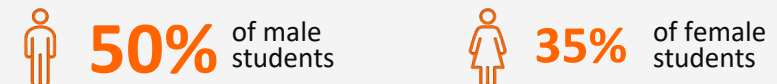
A **parent introduced them** to engineering as a career



They began considering engineering as a career path **in high school**



When first introduced to engineering, **following in the footsteps of a parent or family member** was a top motivator



Q.5 When you were first introduced to engineering, how motivating were the following, if any? NET: Top 3 Box (8-10) Base: All Respondents: Women (N=999), Men (N=2361)

Q.4 Who or what introduced you to the existence of engineering as a career path? Base: Students: Women (N=276), Men (N=807)

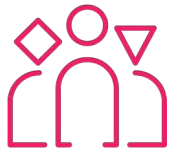
Q.1 At what point did you begin to consider engineering as a career path? Base: Students: Women (N=276), Men (N=807)

Non-technical skills required for success in the engineering industry



There is opportunity to provide training in non-technical skills

Roughly half of students say the skills ranked as most important by engineers are not being taught in their programs, including teamwork, time management, and project management.



Teamwork



56%

of engineers say teamwork **should be required learning**



Time management

55%

of engineers say time management **should be required learning**



Project management

53%

of engineers say project management **should be required learning**



52%

of students say teamwork is **not currently taught**

63%

of students say time management is **not currently taught**

60%

of students say project management is **not currently taught**

Q.19 Outside of the technical skills, what other skills do you believe engineering students should be required to learn for a successful career in engineering? Base: Engineers: Total (N=2278)

Q.20 Outside of the technical skills, what other skills is your degree program currently teaching and which do you wish they would teach to prepare you for a career in engineering? -Currently Teaching Base: Students: Total (N=1083)

Strong problem-solving abilities and a willingness to take on challenges are keys to success as an engineer, demonstrating EQ is as important as IQ

Important qualities for achieving success as an engineer:

Good
problem
solving

89%

Willing to
take on new
challenges

Ability to
work as part
of a team

Ability to
work
individually

88%

Trouble-
shooting
skills

87%

Creativity



Q.18 Thinking ahead to when you have started your career as an engineer, how important do you think each of the following are in achieving success as an engineer? / How important do you think each of the following are in achieving success as an engineer? NET: Important Summary Base: All Respondents: Total (N=3361)

Detailed methodology



Research methodology

In partnership with IPSOS, a global business and consumer research services organization, a survey was fielded from June 4 – July 29, 2021 in 5 regions (the United States, the United Kingdom, China, Taiwan, and Israel) in their native language. The survey used an online methodology with a varied sample per market and per audience. The survey length was approximately 15-20 minutes.

The total sample from the survey includes:

- 1,083 Students
- 2,278 Engineers

Below are the specific sample sizes and margins of error at the 95% confidence level for each market.

Students

Students in this sample are defined as full-time or part-time students working towards a university-level degree in a STEM field who say they are very likely (T3B on 0-10 scale) to consider engineering as a career

	Unweighted sample size (n=)	Margin of error (percentage points)
Global total	1,083	+/- 3
China	302	+/- 6
Israel	74	+/- 11
Taiwan	100	+/- 10
United Kingdom	306	+/- 6
United States	301	+/- 6

Engineers

Engineers in this sample are defined as full-time or part-time employed, self-employed, contract/freelance, or furloughed workers in STEM-adjacent industries who are engineers, have a background as an engineer, or are in training to be an engineer

	Unweighted sample size (n=)	Margin of error (percentage points)
Global total	2,278	+/- 2
China	700	+/- 4
Israel	178	+/- 7
Taiwan	200	+/- 7
United Kingdom	500	+/- 4
United States	700	+/- 4



For more information,
please visit:
kla.com/EngineeringInspiration

