arm

YOUTH ON TECH

Secret Accounts
Robot Teachers
& Retiring at 73

Insights into a technology-driven future based on a global survey of 2,100 youths from 11-18 years old by Northstar Research and Arm

There's no doubt the mobile computing revolution has changed society. It has connected people in new and exciting ways, and inspired one of the most powerful business tools ever - the smartphone. But as any good developer will tell you, to get a design right you must first understand your audience - all of your audience - and that only comes from asking the tough questions.

The desire for more information drove us, as one of the companies guiding the next wave of computing, to launch a new global survey of today's tech-using youth. It was independently carried out by Northstar Research and supported by Dr. Mary Aiken, an eminent cyberpsychologist from University College Dublin. Dr. Aiken has written the report's introduction and added thoughtful analysis throughout.

The findings range from interesting to down-right disturbing, especially if you're a parent like me. As an industry, the tech sector is pushing multiple advanced technologies to maturity and making choices that will affect the generations following us. Collectively, we are taking our responsibilities very seriously; taking an ethical as well as an expert engineering approach to how technologies such as AI are delivered. As part of this effort, we need to uncover the hidden impacts of the digital revolution so, as technology innovators, we can help mitigate potential downside effects. We also need to fully understand our youth's increasing expectations of what technology will allow them to do. By understanding what they want, we are better-placed to deliver it.

This work is part of the Arm Gen 2Z project we began in 2017 to kickstart new conversations between young people and the tech sector. The project involves teenage Youth Ambassadors who we also asked to comment on this report. You'll see their thoughts on the back inside cover.

Introduction by Dr. Mary Aiken

Cyberpsychologist
University College Dublin, Ireland

Technology is ubiquitous and so is the smartphone. It is estimated 70 percent of the world's youth is online in developed countries and 94 percent of young people between 15-24 years old use the internet. And, for the vast bulk of them, the favorite online entry point is the mobile device. This has brought about a technological revolution which has transformed human behavior.

The result of two decades of mobile technological advancement has however not always been positive. Some people feel that they have become too dependent on their digital devices, requiring near constant connection to the internet so they are 'always on'. The smartphone, as the most popular device, has come to dominate people's lives in positive and negative ways. Given the importance of the relationship between young people and technology, we felt it was a good idea to undertake research to understand how young people use and view technology, and what role they think it may play in their future.

The results are truly interesting from a cyberpsychology perspective.

Here are a few noteworthy insights from the survey:

Voice technologies are becoming increasingly popular with younger children who seem to prefer voice-activated devices to those with keyboards and touchscreens. This is positive in terms of ease of engagement but it means that parental oversight is even more important as children can actively engage with internet-connected technology earlier.

Another key finding relates to a significant number of youths experiencing a phenomenon we have described as "Multiple Identity Culture". This became evident as a large percentage of youths reported they had multiple accounts on at least one social media platform. This behavior allows young people to experiment in a cyber context, for example by creating separate social groups. This can be positive but it also raised red flags over potential covert behavior designed to specifically avoid parental oversight, a particular concern in relation to younger children.

Interestingly, most of the young people we surveyed thought their peers spent too long on social media. The perception that 'others' were more guility of technlogy over-use than they were could be due to a time distortion effect or a form of risk minimization. Technology companies seem aware of this effect though and now offer solutions that track, record and highlight online usage.

Personalized information about online usage can help young people to become more mindful of their technology habits. Mindfulness is a good personal strategy as it brings about positive psychological effects, such as increased well-being, reduced psychological symptoms and, in terms of technology use, improved behavioral regulation.

Mindfulness may also help to deal with cognitive dissonance; a psychological state whereby mental discomfort is experienced by a person who simultaneously holds two or more contradictory beliefs. This was evident in our study as many youths acknowledged social media could be 'addictive' and problematic, yet they said they still felt compelled to engage in high usage.

As well as looking at high usage in general, we should look at the complex relationship between smartphones, social media and the internet ('entities'), and how young people use them in combination. Further research on this relationship is required as it may help technology makers to create new entity-specific safety features.
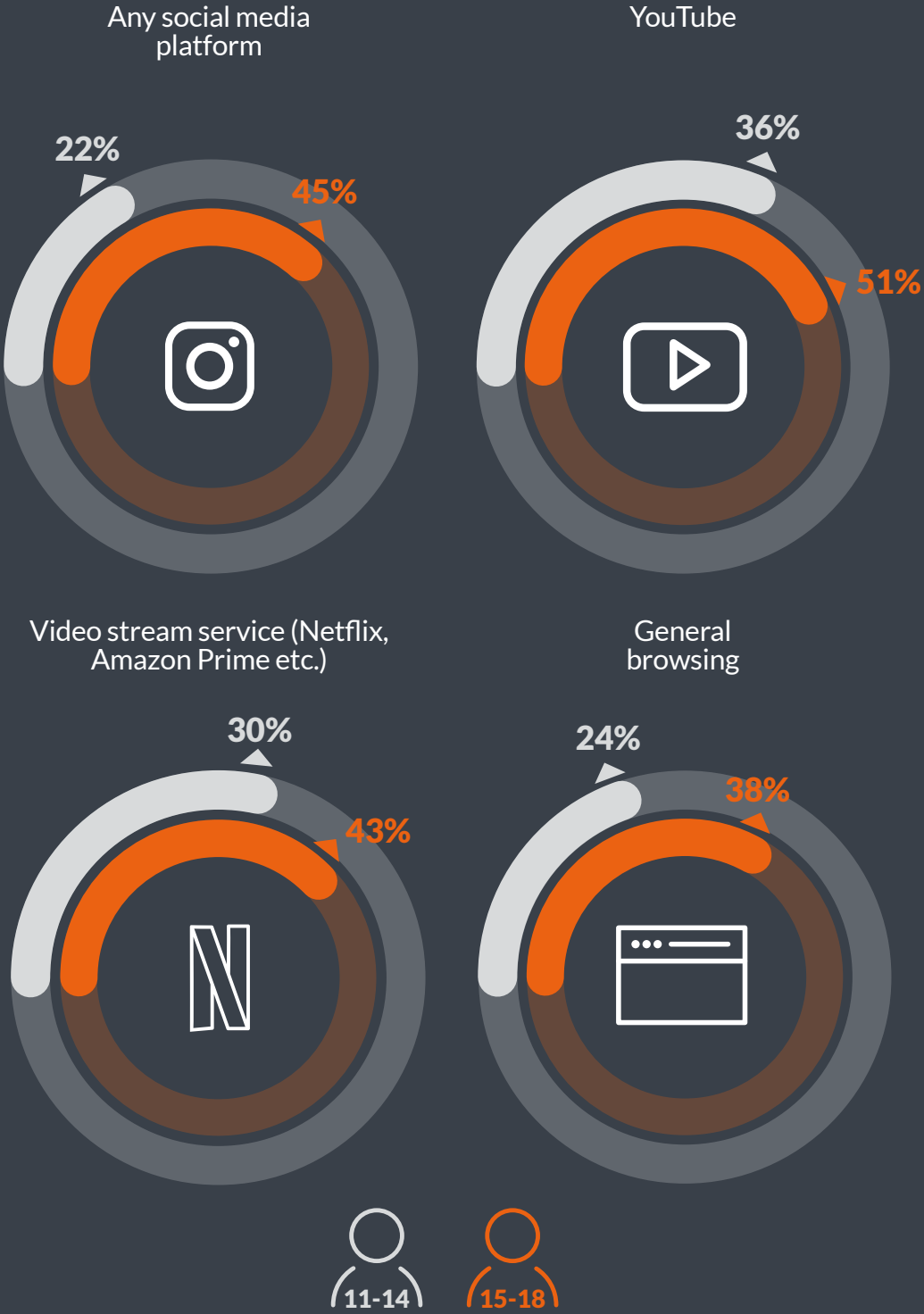
Further research can also help us to understand if the perception of technology as 'addictive' stands up. It is currently a problematic conclusion given a clinical model of smartphone, social media or internet addiction has not yet been established. The real issue may be that technology in itself is not good or bad when it comes to addiction, it is really a matter of how well, or not, it is designed for real-world human-use.

Not withstanding a potential gap in the research, a more human-centric approach to technology design can result in a better user experience. And judging by the in-depth knowledge and insight displayed by the youth who participated in our survey, I certainly hope that the views of young people will be fully considered.

High Smartphone and Internet Usage

Smartphone usage among young people is ubiquitous – with 81% using a device daily according to our survey. A significant proportion are regularly online for more than an hour a day. Social media use is far lower in the 11-14 year-old age group but younger and older children are generally closer in their preferences for consuming online video content. This finding is consistent with the latest Pew Internet report (2018) which found that when it comes to teen preference for online platforms roughly one-third said they visit YouTube (32%) most often.

In a normal day, how much time do you spend on each of the following? % use of 1 hour or more

Any social media platform

22%

45%

YouTube

36%

51%

Video stream service (Netflix, Amazon Prime etc.)

30%

43%

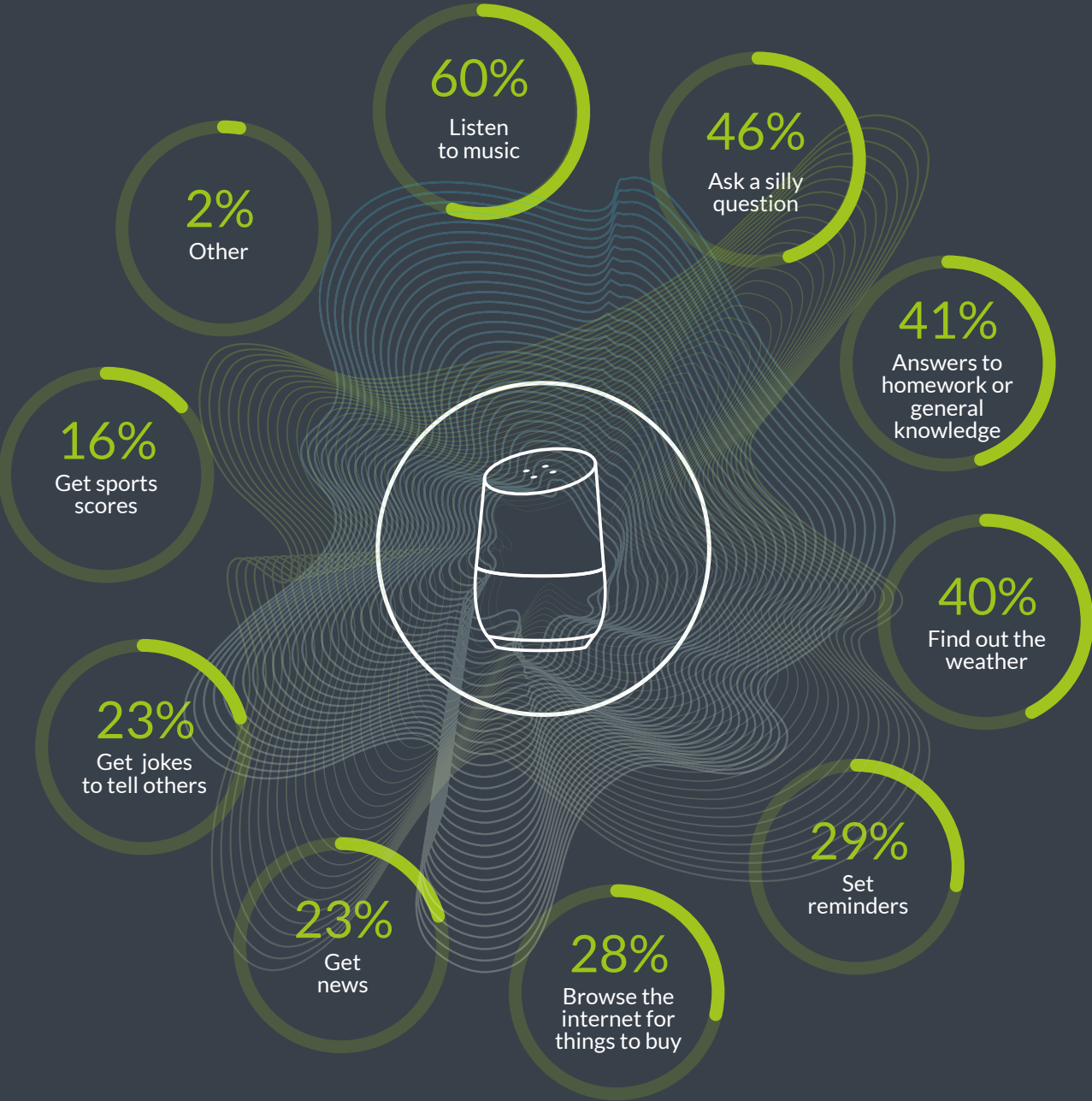General browsing

24%

38%

11-14

15-18

An Increased Appetite for Voice Technology

Voice-activated devices are increasingly popular, with 60% of youths using a voice-activated product on a regular basis and for multiple purposes. Much of the usage appears to be highly constructive with 41% of respondents saying they use voice-activated devices for homework or general knowledge and around a quarter using voice to get news.

'Voice' has an even greater appeal for younger children, with 11-14 year-olds preferring voice activated devices to physical inputs (e.g. typing). This is most likely due to the ease of interface and the fact that 11-14 year-olds have grown up with voice technology, much like young adults (15-18) grew up computing on touchscreens.

The preference among 11-14 year-olds for voice-activated computing may also be rooted in the fact that speech is a primary tool in human communication. It is well-established that infants show a preference for listening to speech from birth. It terms of interaction, 46% of youths surveyed also said they liked to "ask it silly questions to see how it responds" an important finding for developers as it shows that synthesized speech is likely to be more appealing when it mirrors truly social communication, rather than simply functioning as an information delivery tool.

What do you use your voice activated device for?

60%
Listen to music

46%
Ask a silly question

2%
Other

41%
Answers to homework or general knowledge

16%
Get sports scores

40%
Find out the weather

23%
Get jokes to tell others

29%
Set reminders

23%
Get news

28%
Browse the internet for things to buy
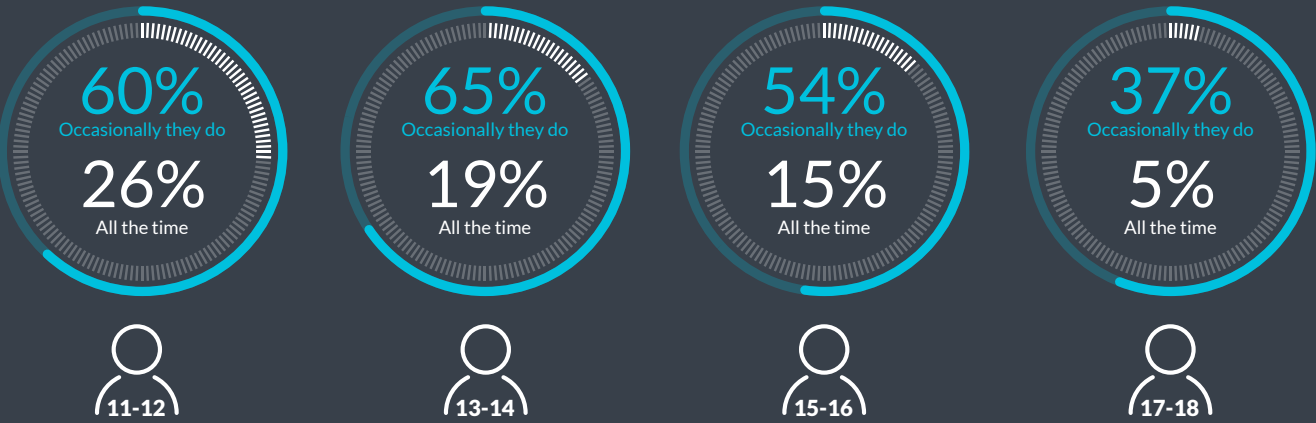
Parental & Personal Concerns

Little is known about the impact of high internet use on the physical and mental health of youths. However, Rob Reich, professor of political science at Stanford University, believes "the harms have begun to come into view just over the past few years, and the trend line is moving consistently in a negative direction".

However, parents seem aware of the risks as our survey shows that the majority of youths sometimes have limitations on time spent with technology. This is highest among 11-16 year-olds where the majority of youths have online time restricted occasionally.

Most 11-14 year-olds also think their parents secretly check their online browsing history. This is a cause for concern as covert surveillance of a young teenager can be counterproductive. An increase in hypervigilance, through secretive checking of teens' online activities, will not help to build trust in the parent-child relationship and can lead to increasingly risky online behaviors by driving activities undercover. It may be more productive for parents to openly discuss acceptable online behavior with their child, and to check on the websites their child is visiting by asking them to go through their browsing history.

> Parents should take notice of broad concerns regarding the use of technology and specifically social media. However, there should also be consideration of more specific behaviors, notably what we describe as 'Usage Denial' and 'Multiple Identity Culture.'
> – Dr. Mary Aiken

Do your parents limit the amount of time you spend using technology?

11-12	13-14	15-16	17-18
60% Occasionally they do	65% Occasionally they do	54% Occasionally they do	37% Occasionally they do
26% All the time	19% All the time	15% All the time	5% All the time

Do you think that your parents check your online browsing history? (Those expressing a clear view)

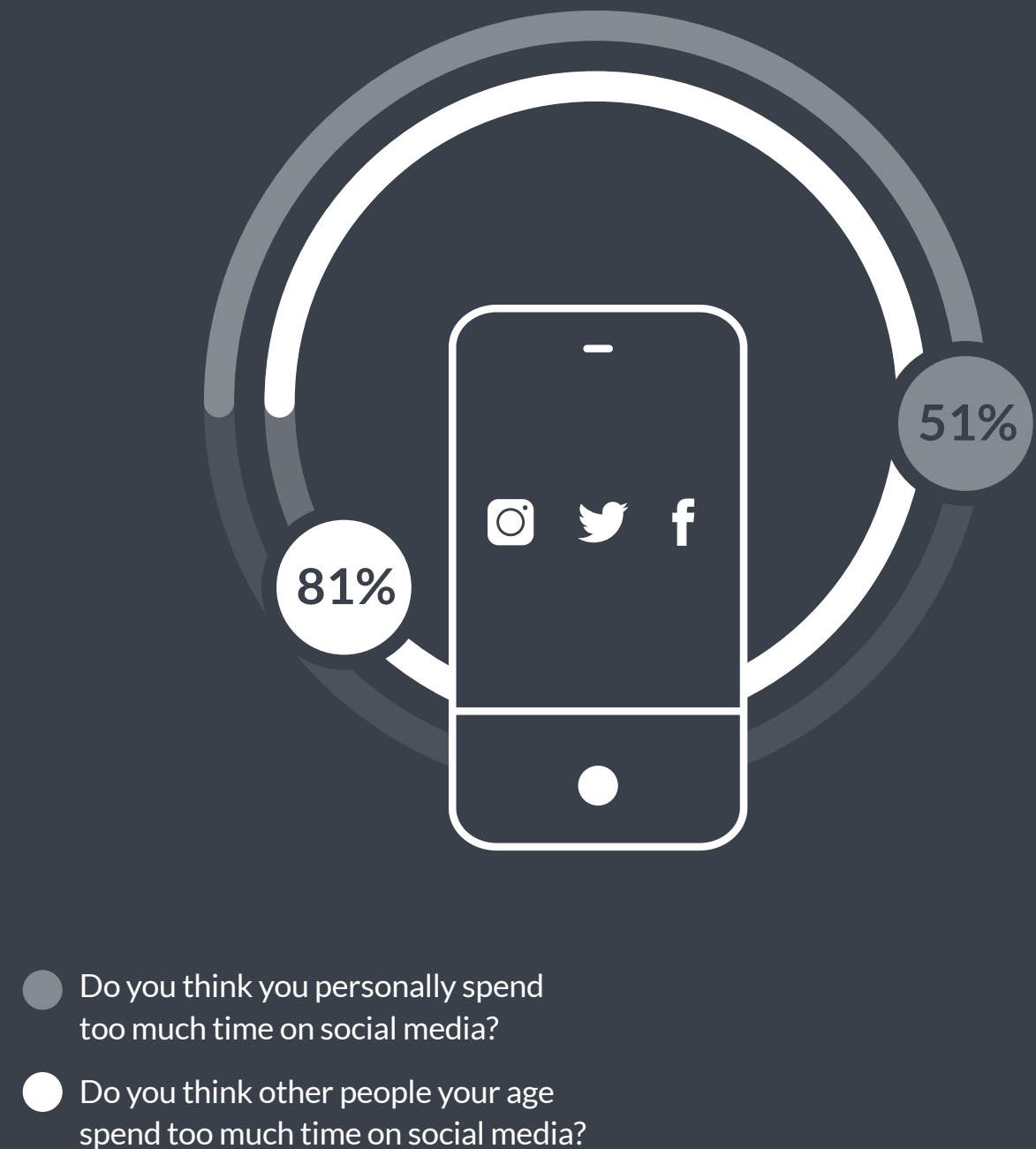| 11-12	13-14	15-16	17-18
32% NO	43% NO	69% NO	85% NO
68% YES	57% YES	31% YES	15% YES
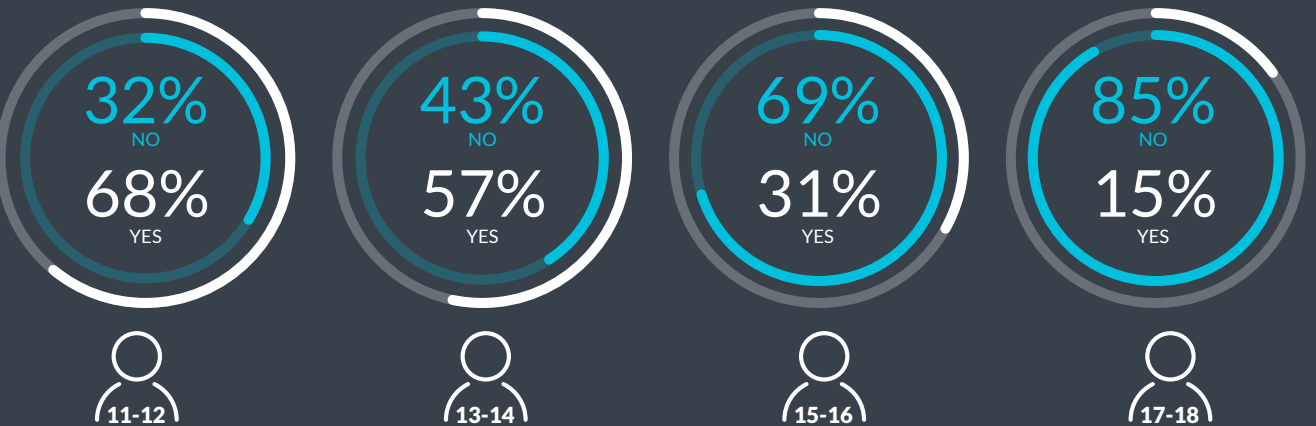
Usage Denial

Social media usage among the world's youth is generally high but young people in general seem divided on whether they themselves spend too long on their social channels. This is apparent when asked about 'other' people's social media habits, with four in five youths thinking over-use was common in their peer groups. Yet, when asked about themselves, only half of children thought they were personally using social media too much. This may mean youths are unaware of the time they're spending on social media - perhaps as a result of a time distortion effect, or they may simply be in denial.

Still, most (59%) of youths told us they liked to get information on their social channel usage which may indicate a growing realization about over-use risks. Tech companies have also made it easier for users to receive information on their app habits and parents can readily impose screen time limits on their children's devices. The new screen time additions and weekly usage statistics showing the amount of time spent on individual apps may be helpful in dealing with Usage Denial, and in creating 'mindfulness' around technology use. This data is also very useful for parents as it gives them independent evidence on device use which can then be discussed with a child. Google's offer in this area is beta-named 'Digital Wellbeing' suggesting an awareness of the importance of a balanced digital life.

% stated Yes

51%

81%

● Do you think you personally spend too much time on social media?

○ Do you think other people your age spend too much time on social media?
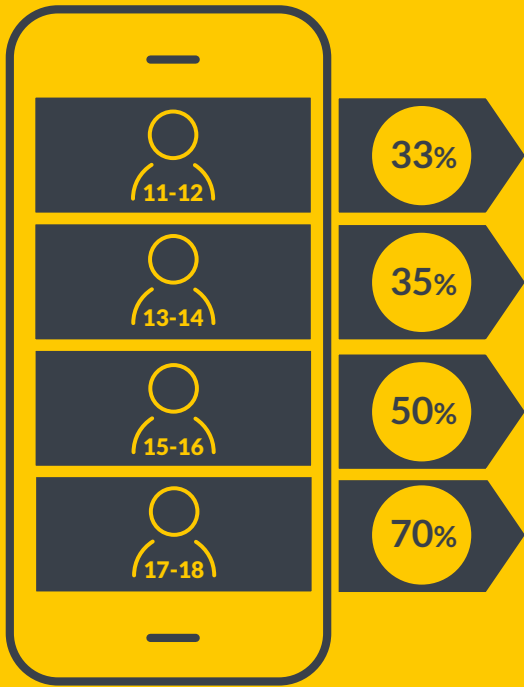
Multiple Identity Culture

As mentioned in the report foreword, one of the most interesting findings from our survey is that 47% of youths have multiple accounts on at least one social media platform. This is heightened among 17-18-year olds, where the number rises to 70%.

This 'Multiple Identity Culture' allows youths to be more experimental online and to have many different identities. Reinforcing the notion of a need for secrecy, we found that 41% of young people wanted secret accounts that "no-one knew about" and 44% wanted accounts that "only a few select friends" were aware of.

A subset (19%) also said they had multiple accounts to specifically hide their activity from their parents, most likely to prevent the secret monitoring that many suspected was taking place.

With so many social media accounts to manage, and potentially so many identities to lead, it's no wonder that youths are spending so much time online. However, the good news is that despite leading technology-heavy lives, many youths are beginning to recognize the potential downsides and are taking positive action to restore balance.

Do you have more than one account on any social media platform? % who stated Yes

Age	%
11-12	33%
13-14	35%
15-16	50%
17-18	70%

Please tell us why you have more than one account on some social media platforms?

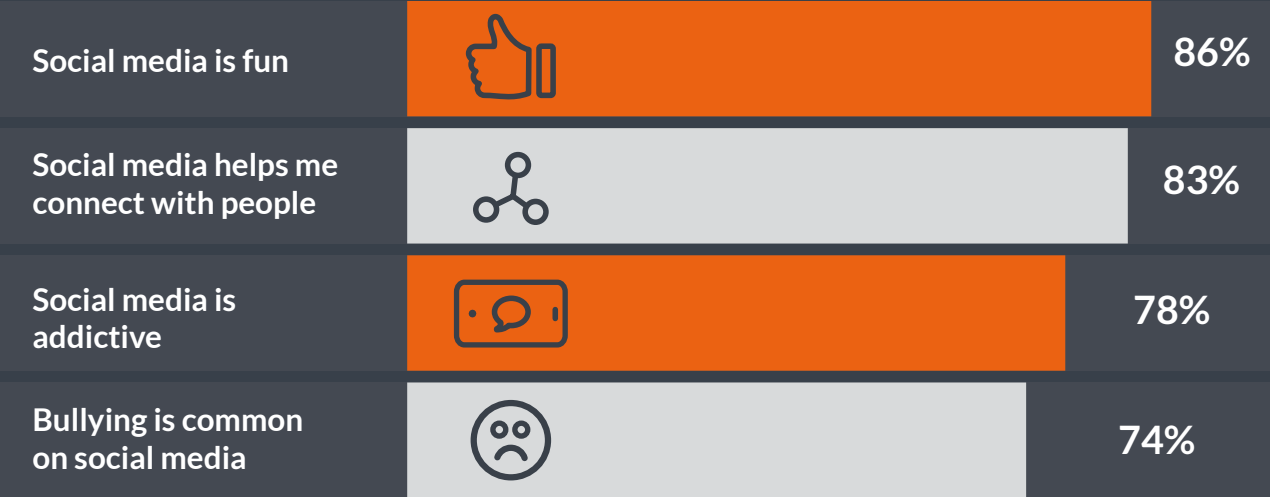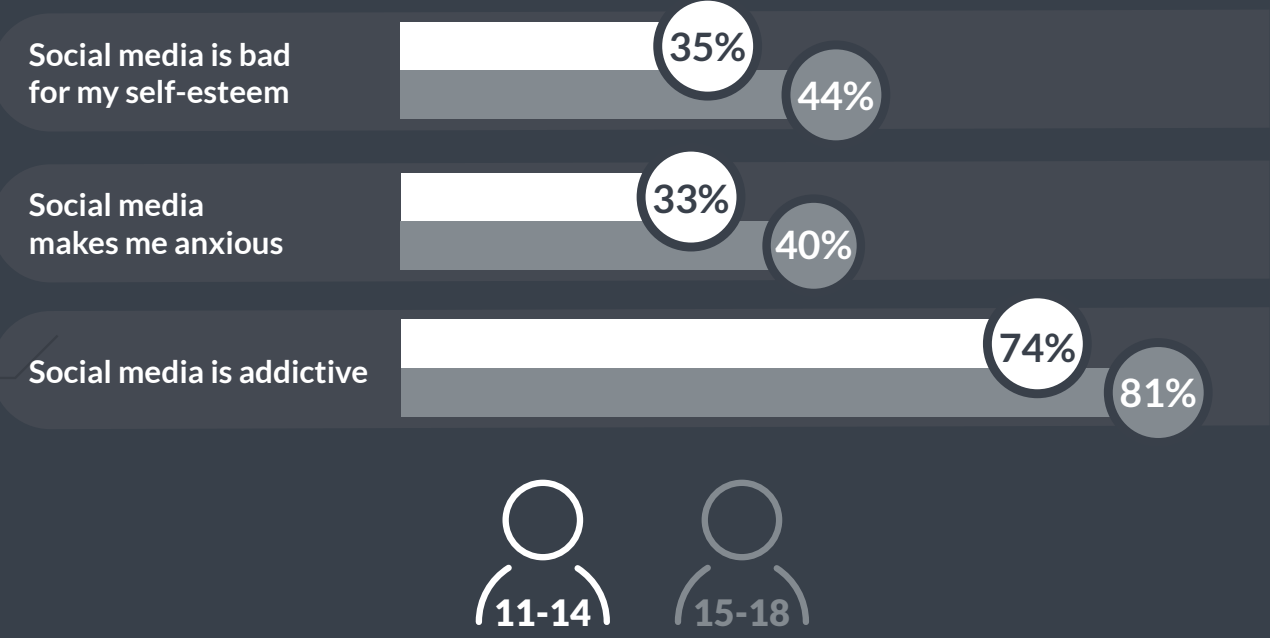| Reason	%
I keep a secret account only a few of my friends know about	44%
I like to have an account no one knows about	41%
I don't want my parents seeing my social media activity	19%

Negative Notions Around Technology

The excessive use of social media is polarizing today's youth. While they see the benefit of having fun and being connected, they also see the darker side of bullying and addiction. Yet, despite knowing social media can be 'addictive', high usage persists.

Negative feelings towards technology run deep among 15-18 year olds. This age group acknowledges a number of negative effects, yet paradoxically, it is 15-18 year-olds primarily driving the increase in social media use by youths. Given the admissions of lower self-esteem, anxiety and feelings of addiction reported at higher levels in the 15-18 year-old age group, it would be highly useful to conduct further research on the advice this group would like to give to younger users, and whether they would recommend more self-limiting online behavior at a younger age.

Do you agree with the following statements about social media?

Statement	%
Social media is fun	86%
Social media helps me connect with people	83%
Social media is addictive	78%
Bullying is common on social media	74%

Do you agree with the following statements about social media?

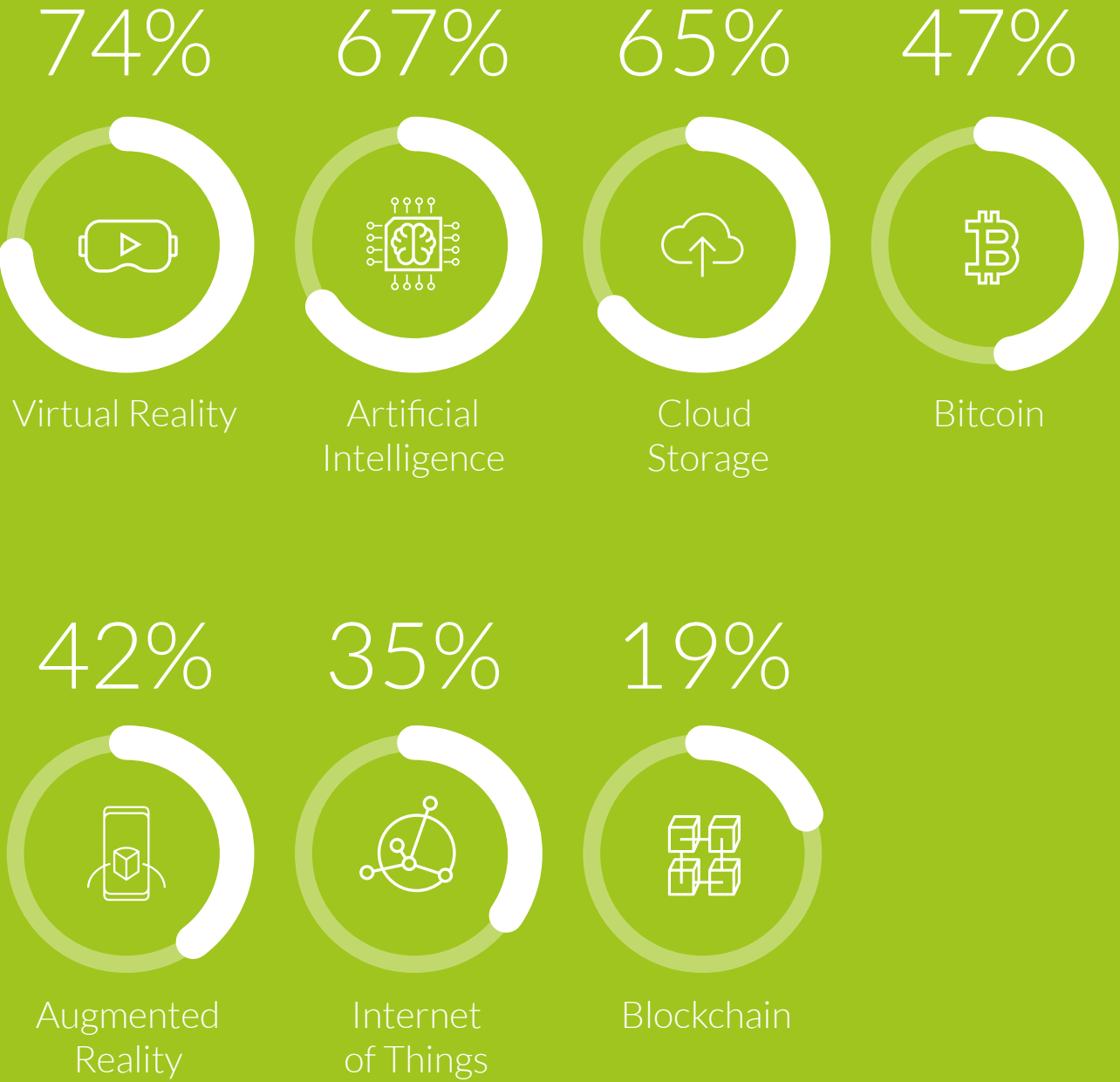| Statement	11-14	15-18
Social media is bad for my self-esteem	35%	44%
Social media makes me anxious	33%	40%
Social media is addictive	74%	81%

11-14 15-18

Youth & the Positive Potential of Tomorrow's Technology

Today's youth are benefiting from technological innovation that is more powerful than that readily available to previous generations. The advent of faster communications and more data-handling ability of new 5G-enabled networks will further enhance this. Their technology-driven lives means most youths are extremely aware of technological advances including Virtual Reality (VR), Artificial Intelligence (AI) and the Cloud. This awareness is evident even in the youngest children; the majority of 11-12-year olds know at least 'a bit' about VR (68%), AI (57%) and the Cloud (53%).

Young people's awareness about new technologies, and how they might help or hinder them, is also probably deeper than most adults might imagine. This awareness is also having a positive impact on their expectations, with our survey suggesting most young people are very positive about the effect technology will have on society, especially in areas such as job creation.

Are you aware of any of the following technologies? % net "Yes, I know a little about this" and "Yes, I know a lot about this"

74%
Virtual Reality

67%
Artificial Intelligence

65%
Cloud Storage

47%
Bitcoin

42%
Augmented Reality

35%
Internet of Things

19%
Blockchain

Positive Emotions

The value that technologies such as the Cloud, AI and Augmented Reality can deliver is recognized and the majority of youths are either excited, happy, hopeful or optimistic about the role advanced technologies will play in their lives.
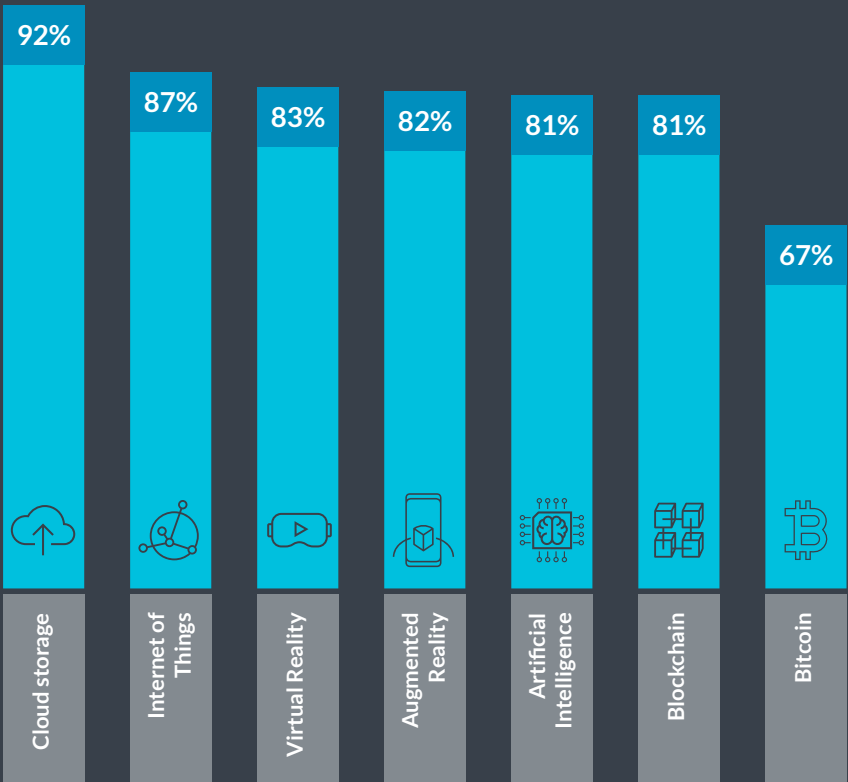
But despite expressing mainly positive sentiments, young people were also negative about some future technologies such as robotics; "scares me," "dangerous" and "frightening" were words used. It is therefore important to acknowledge that some children are worried about the impact of more advanced technologies in future.

Breaking that down further, the results show that young adults are significantly more negative about the potential downside risks of advanced technology than their younger contemporaries.
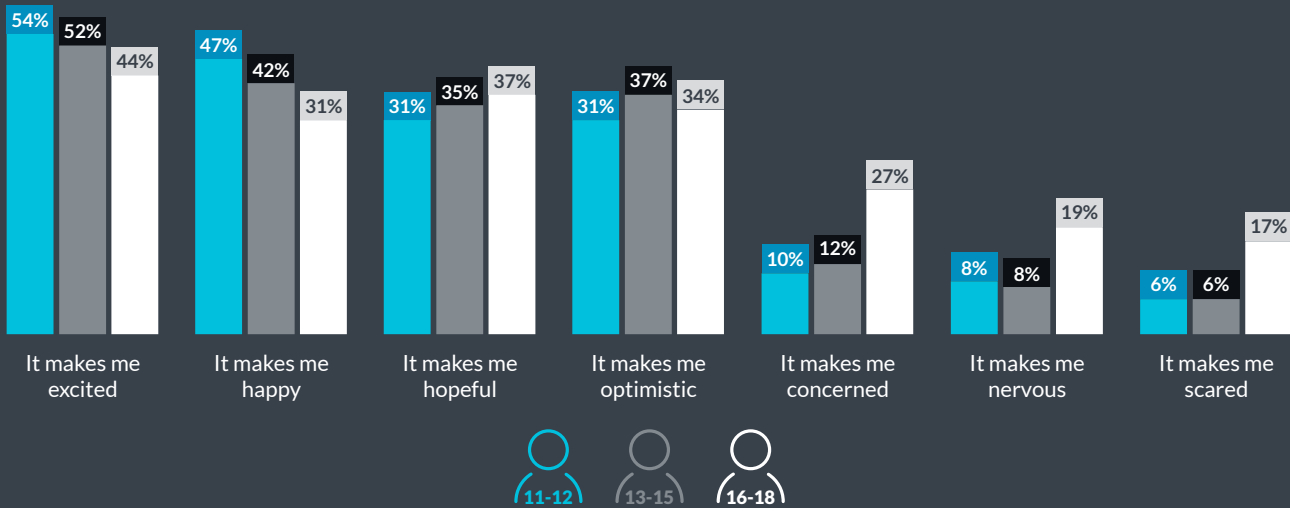
This may be driven by an age-related increase in awareness as youths are exposed to discussions over the potential impact of new technologies in the media and at school. However, it will be interesting to see whether this trend towards negativity continues as today's younger children age, or if there is a genuine difference in the subgroups. Might today's 11-year-olds be naturally more positive about AI as they are growing up with it, in the same way they are more positive about voice-driven devices?

Children think broadly about the future of technology, for example its role within education, jobs and healthcare.

% Yes, technology is good for society (asked to those who knew "a bit" or "a lot" about each technology)

Technology	%
Cloud storage	92%
Internet of Things	87%
Virtual Reality	83%
Augmented Reality	82%
Artificial Intelligence	81%
Blockchain	81%
Bitcoin	67%

Please think about the role that technology will play in your life in the next 10 years. How does this make you feel?

	11-12	13-15	16-18
It makes me excited	54%	52%	44%
It makes me happy	47%	42%	31%
It makes me hopeful	31%	35%	37%
It makes me optimistic	31%	37%	34%
It makes me concerned	10%	12%	27%
It makes me nervous	8%	8%	19%
It makes me scared	6%	6%	17%

Education

The potential for technology to make positive changes to education has been much discussed.
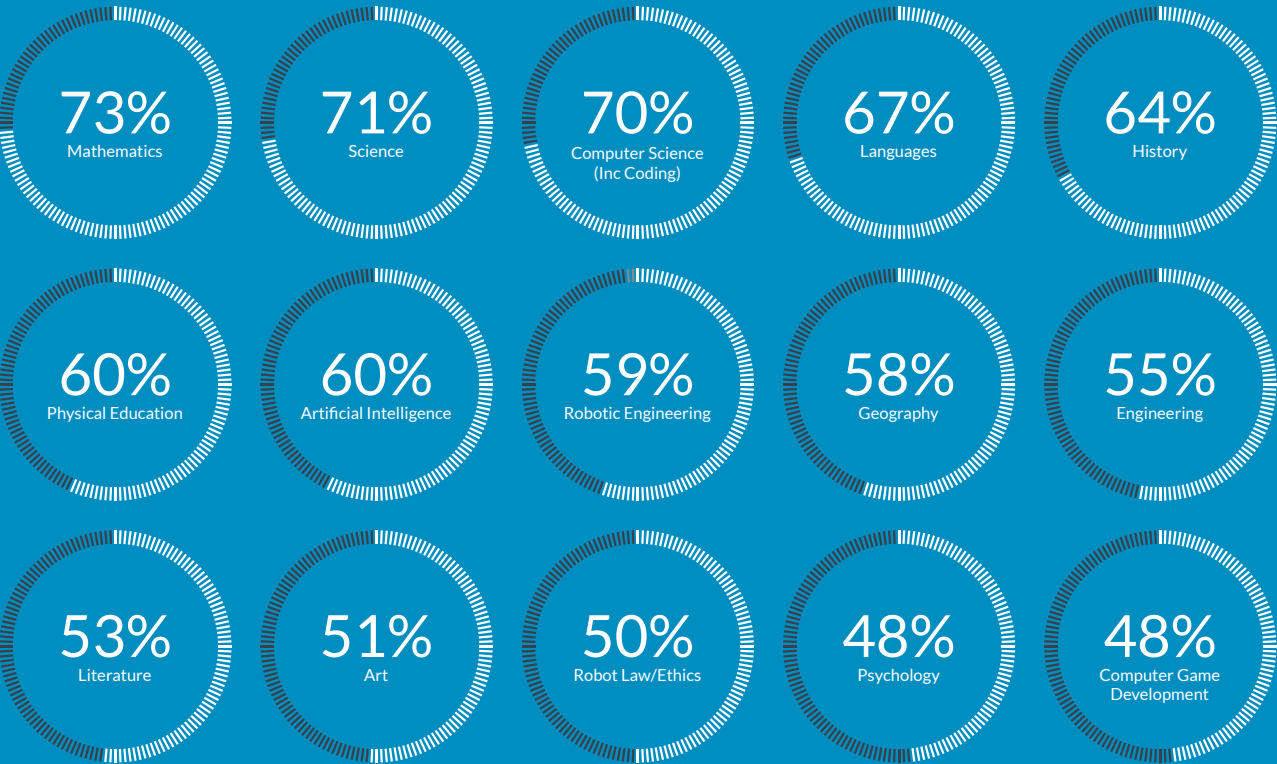
In his TED talk "The Future of Learning", education expert Sam Chaltain says:

> We must prepare our children for their future, as opposed to our past.

He argues today's schools have not changed enough to reflect modern needs. Indeed, most of the subjects taught within schools are now no different from one or two generations ago.

Indeed, youths don't disagree. STEM subjects are still core but in 20 years may also be complemented by courses covering AI, robotics and computer game development.

Think forward to the year 2038 (20 years from now), which of these subjects do you think will be taught in schools?

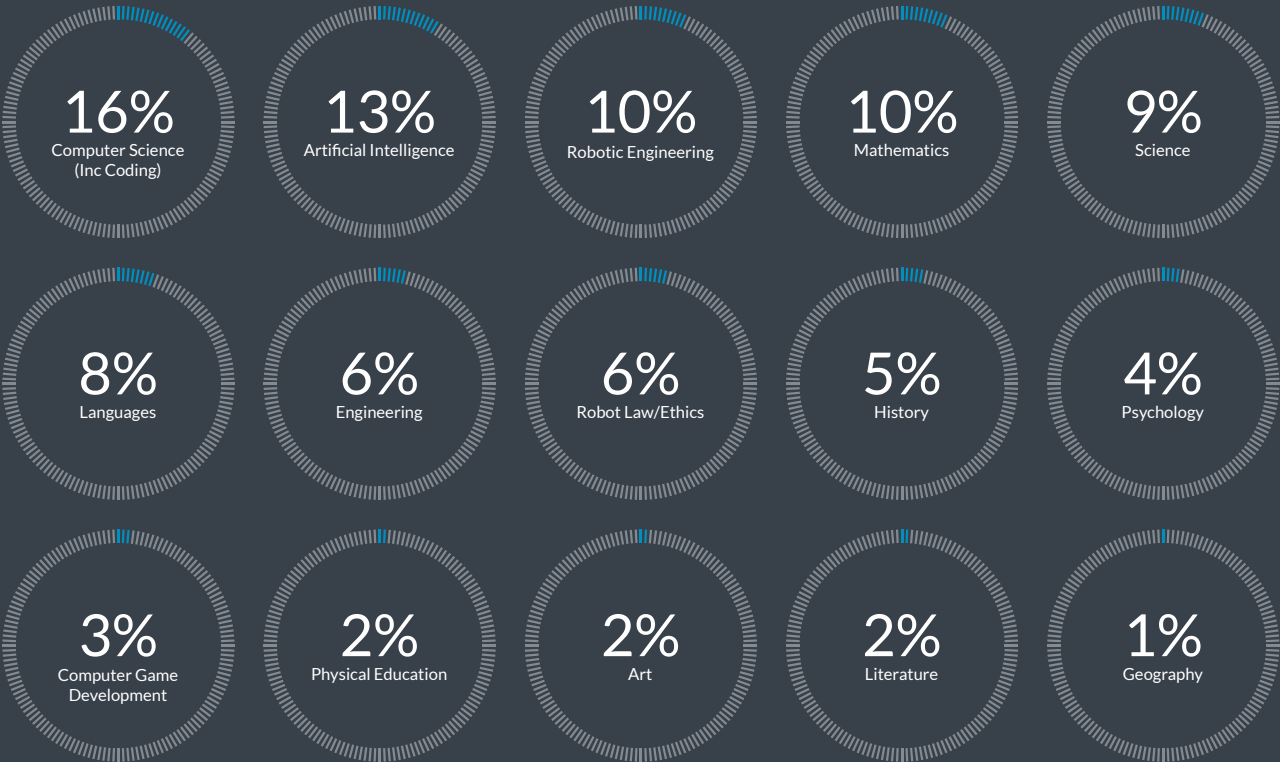| 73% Mathematics	71% Science	70% Computer Science (Inc Coding)	67% Languages	64% History
60% Physical Education	60% Artificial Intelligence	59% Robotic Engineering	58% Geography	55% Engineering
53% Literature	51% Art	50% Robot Law/Ethics	48% Psychology	48% Computer Game Development

Education (Cont.)

Today's young people believe the two most important subjects to study in the future will be Computer Science and AI. Joint third is Mathematics and Robotic Engineering.

Youths clearly recognize the extent to which schools must change to meet the needs of a future workforce. Interestingly this is driven by 11-12 year olds, who place the greatest importance on learning about new and emerging technologies.

However, our youth populations don't just see technology as part of the curriculum. They see it as a platform to deliver education as well, including the use of robot teachers.

Which subjects will be the most important to study 20 years from now?

16% Computer Science (Inc Coding)	13% Artificial Intelligence	10% Robotic Engineering	10% Mathematics	9% Science
8% Languages	6% Engineering	6% Robot Law/Ethics	5% History	4% Psychology
3% Computer Game Development	2% Physical Education	2% Art	2% Literature	1% Geography

Of the following subjects, which do you think will be the most important subject to study in the future?

Computer Science
19%
16%
16%
14%

AI
16%
15%
12%
10%

Robotics Engineering
11%
10%
10%
7%

11-12   13-14   15-16   17-18
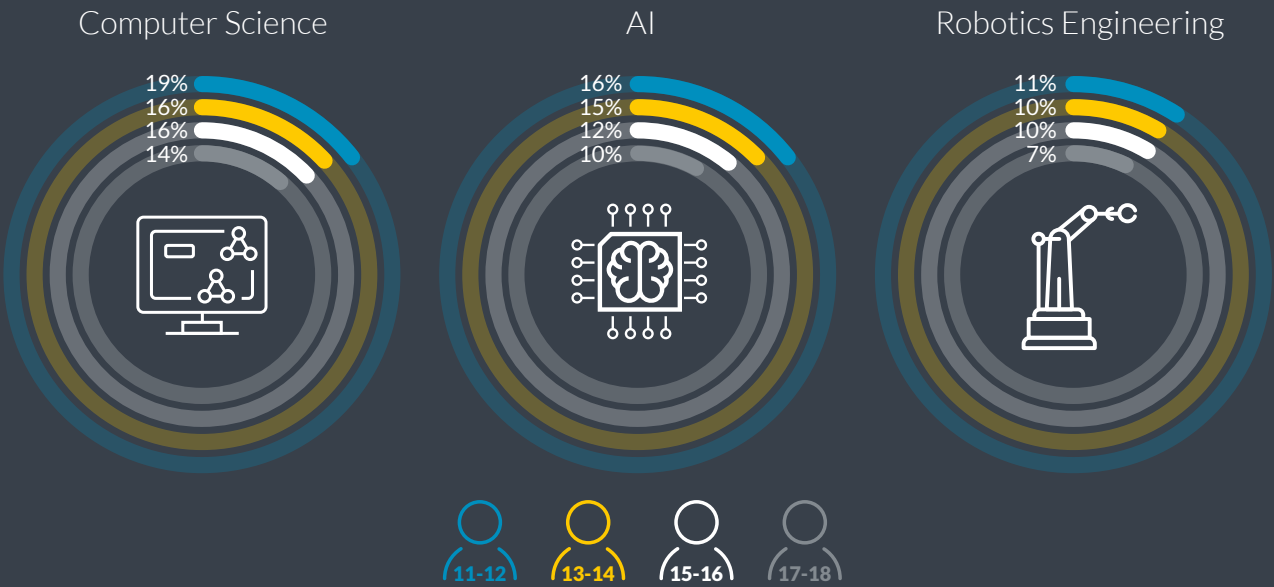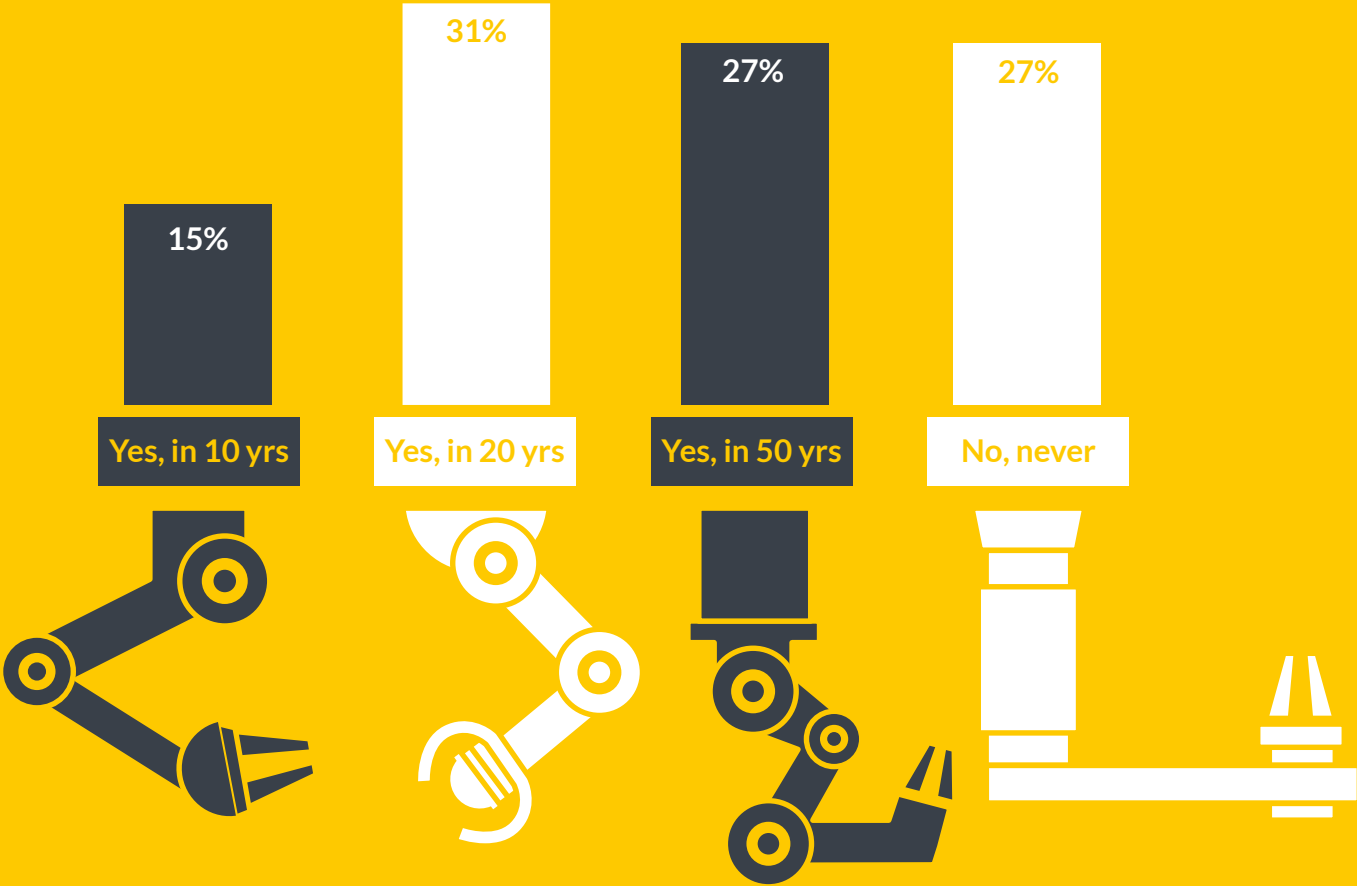
Robot Teachers

According to our survey, the majority of youths internationally (73%) expect to see robot teachers in schools within 50 years, with 46% predicting robots in the classroom within the next two decades.

Overall, 73% of youths think robot teachers will be around at some stage in the future and 40% think it would be a positive. There is a greater openness to this among 11-16 year-olds.
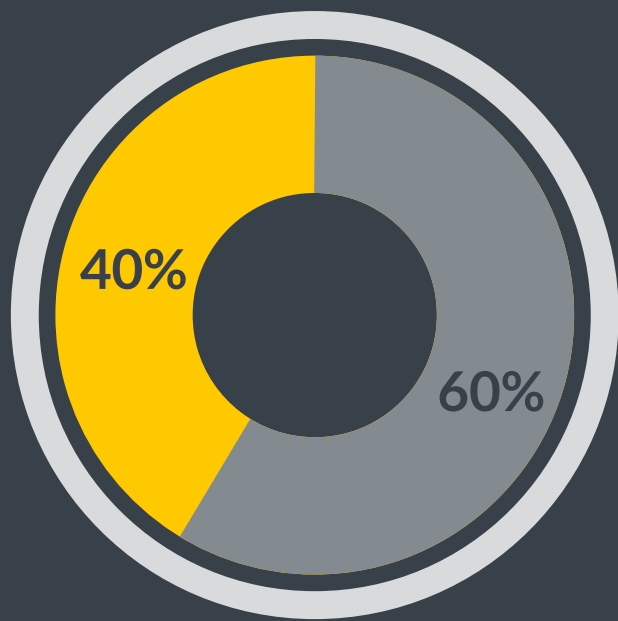
Despite the emergence of classroom technologies, some elements of today's education are predicted to remain constant.

The role of the teacher may well evolve but 80% of youths believe the teaching profession is not under threat from technology. Similarly, while schools may look and feel significantly different, 72% of youths believe that schools, as physical structures, will continue to exist, even if robot teachers become commonplace.

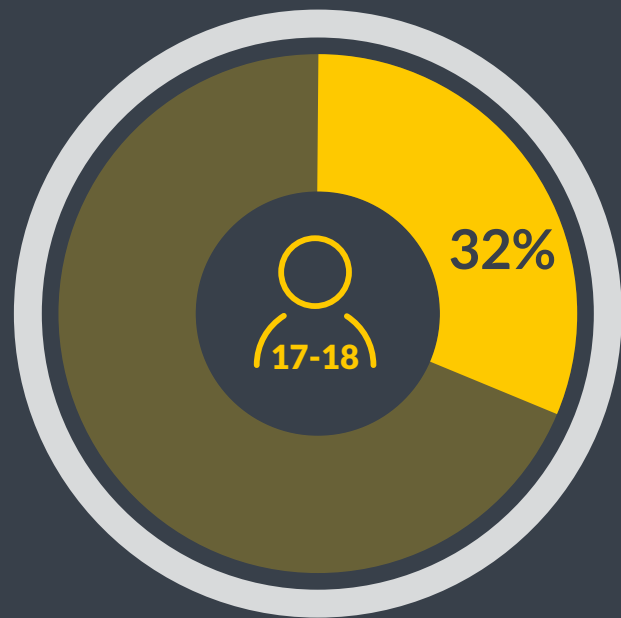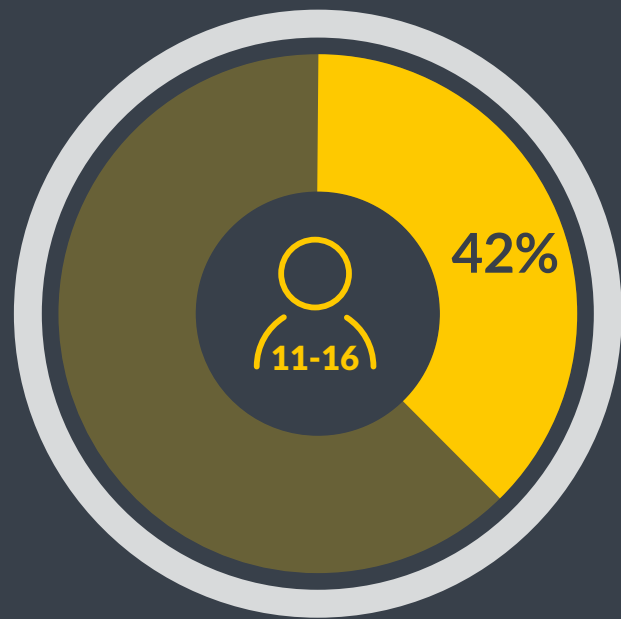**In the future, do you think robots will teach in schools?**

15%	31%	27%	27%
Yes, in 10 yrs	Yes, in 20 yrs	Yes, in 50 yrs	No, never

Would you like to be taught by a robot teacher at school?

Would you like to be taught by a robot teacher at school? % Yes (broken into age range)

Do you think schools would need to exist if people could be taught at home by robots?

% selecting "Teacher" as a job that may not exist in the future because of technology

40%

60%

42%
11-16

32%
17-18

28%

72%

20%

80%

Yes, I would like to be taught by a robot

No, I would not like to be taught by a robot
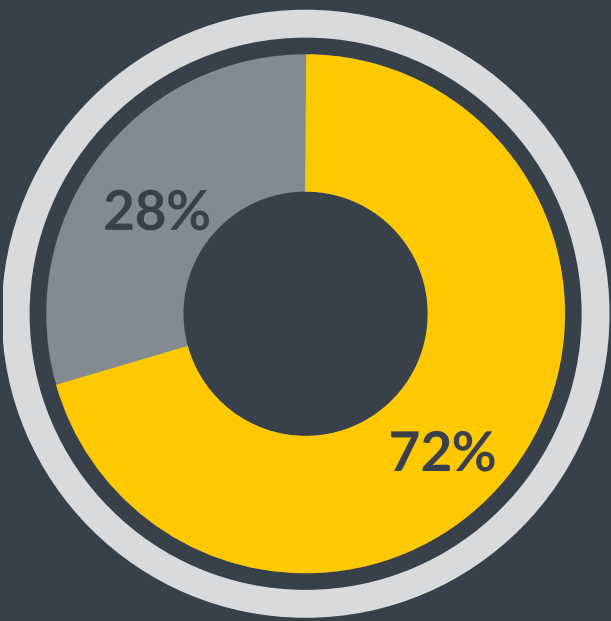
Yes, schools would still need to exist

No, schools would not need to exist
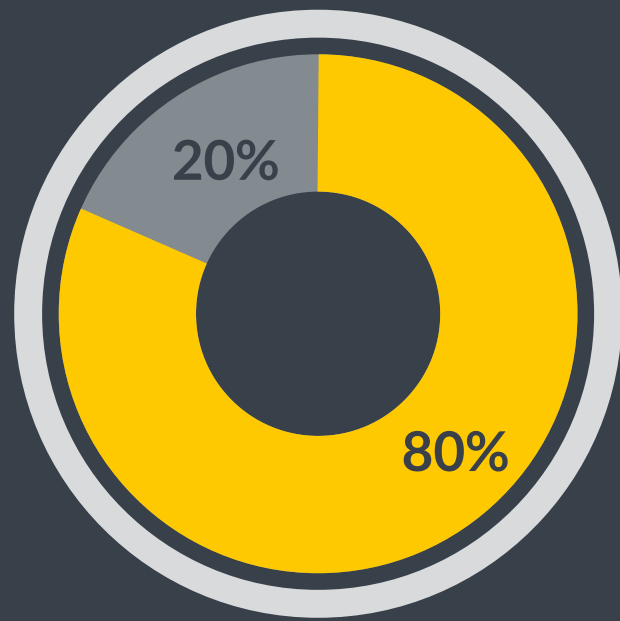
Yes, it will exist

No, it may not exist

Personalized Learning

Robot teachers are more scalable in theory than human teachers and could provide the kind of personalized learning that is difficult to deliver now. Notably a chatbot can communicate with up to 10,000 people simultaneously which has potential implications for the future of AI-enhanced education.

Anthony Salcito, Vice-President of Education at Microsoft, recognizes the need for change:

> The way students learn, share ideas, get access to content, create and collaborate is fundamentally different [than what it used to be]. Their mindsets are different, and the workplaces we are preparing them for are different.

One change Salcito and many other experts are supporting is a shift towards personalized learning, from a teacher-classroom dynamic, where children all learn at roughly the same speed, to a new era of ultra-personalized learning, where tailored content is delivered to match each individual child's ability. The emergence of modern technologies can make this a reality as long as schools can afford to make the shift. One huge boon could be a step-change in how children with learning differences are helped, as is highlighted in an article on The Tech Edvocate last year.

As we head into an era of technology-augmented education it has been found that when it comes to learning the medium matters. The latest research shows that children and young people are not learning as well from technology as may have been expected. Analysis of 170,000 young Europeans found they are more likely to absorb information from printed books than screens - even though they have grown up surrounded by compute tablets and smartphones. This finding presents a significant challenge for digitally-enhanced education.

Our survey suggests young people see technology helping educators but does the same sentiment carry over into thinking about the future workplace?

Jobs

The balance between future educational systems and the demands of an ever-evolving jobs market may dictate how prepared, or not, youths are for the world of work. Not only this, technology will in part determine the jobs created for them, the jobs that will cease to exist and the technological characteristics of the workforce they join.

Job Creation

Our survey found that youths believe technology advancement will create "more opportunities for new kinds of jobs". This sentiment is highest in the 11-12 year-old age group, possibly as they may instinctively feel they will be able to choose from an even greater array of tech-driven careers as new businesses emerge. Our findings are supported by a report from the Institute for the Future (IFTF) which estimated around 85% of the jobs today's school children will do in 2030 haven't yet been invented.
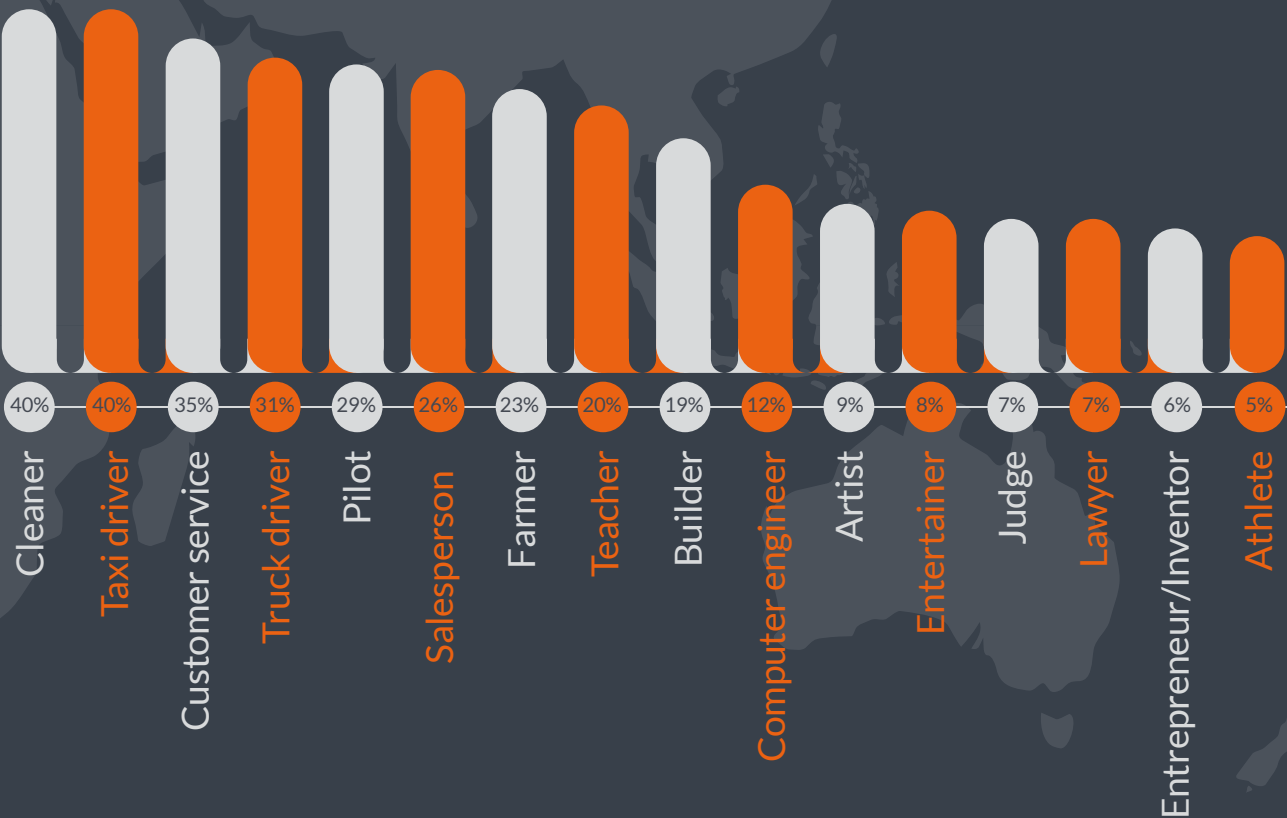
Do you think advancements in technology will create more opportunities for new kinds of jobs? % Yes

87%

76%

11-12

13-18

Job Losses

It has been forecast that new technologies will lead to new jobs with automation and robotics taking over certain skilled and unskilled jobs done by people today. As a result, youths surveyed identified several jobs they think will vanish. Interestingly, views expressed are quite similar to predictions that have been made by media and industry entities.

Below are lots of different jobs. Please select all the jobs, you believe, may not exist in the future because of technology.

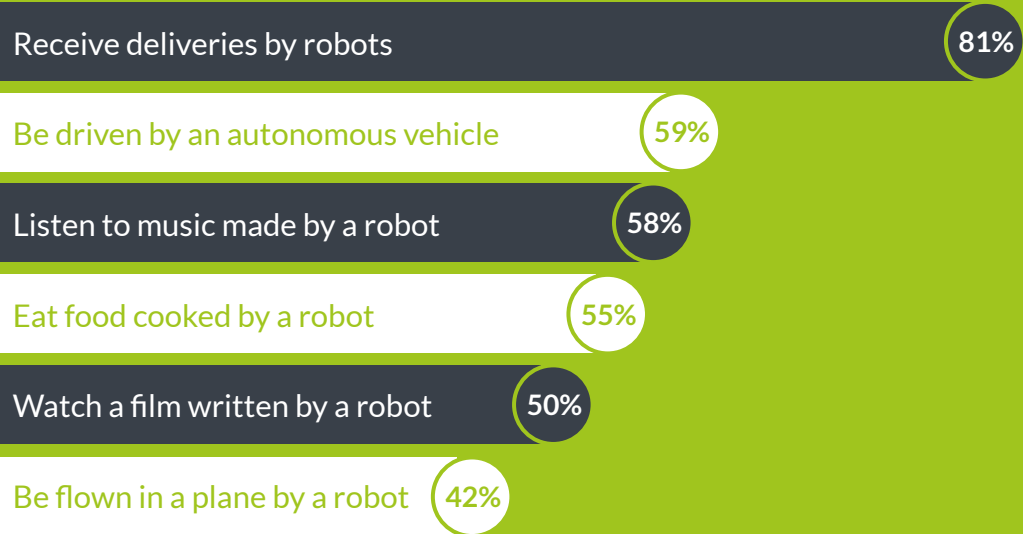| Cleaner	Taxi driver	Customer service	Truck driver	Pilot	Salesperson	Farmer	Teacher	Builder	Computer engineer	Artist	Entertainer	Judge	Lawyer	Entrepreneur/Inventor	Athlete
40%	40%	35%	31%	29%	26%	23%	20%	19%	12%	9%	8%	7%	7%	6%	5%

A Robotic Workforce

The youth of today will be the co-workers, customers, patients and passengers of the world's new robotic workforce. Most youths seem happy with that, but opinions vary on how robot/human interactions will evolve.
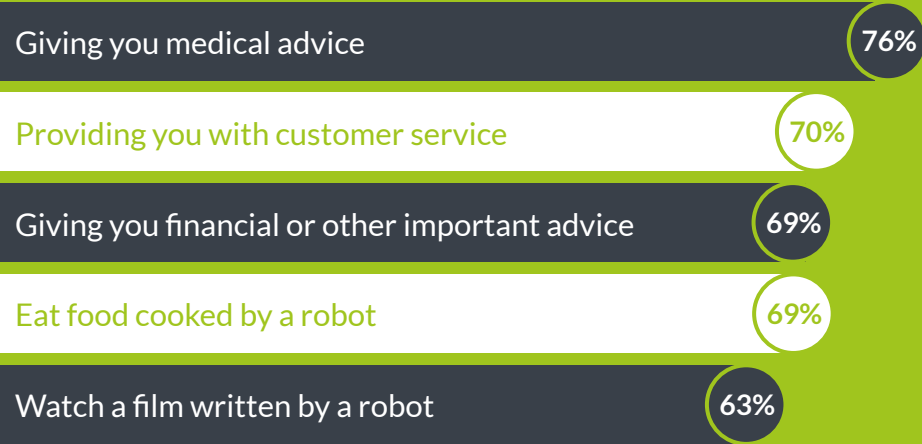
Comfort around engaging with the robot workforce ranges from high positivity for services such as receiving deliveries, to more caution about robot-piloted planes. Interestingly, slightly more than half of our survey group said they would be very happy for robots to cook for them.

Our survey suggests there is some concern about how AI will be used, for example, to sell goods over the phone. As robot-use is bound to become more commonplace, youths are demanding more transparency – with robots forced to declare themselves when it may not be obvious. According to our results, this was most important in sensitive areas such as the giving of medical advice with 76% of responders saying the robot (artificial intelligence) should declare itself. This is in line with a new Bot Disclosure law (SB-1001) that will go live in July 2019 in California, that will force companies using bots to ensure their non-human status is revealed in any conversation.

% would be happy to...

Receive deliveries by robots	81%
Be driven by an autonomous vehicle	59%
Listen to music made by a robot	58%
Eat food cooked by a robot	55%
Watch a film written by a robot	50%
Be flown in a plane by a robot	42%

Do you think robots should be forced to identify themselves as a non-human when they are doing the following activities?

|	
Giving you medical advice	76%
Providing you with customer service	70%
Giving you financial or other important advice	69%
Eat food cooked by a robot	69%
Watch a film written by a robot	63%

A Robotic Workforce (Cont.)

The robot identification conundrum becomes even more important as robot intelligence capabilities evolve, with 89% of young people believing that, at some point, talking to a robot will be indistinguishable from talking with a human. Interesting, 55% think this will happen within the next ten years. These figures are very close to the results of adults polled in a previous Arm/Northstar Research survey on voice technology in 2018 whereby 85% of respondents thought robots would be able to mimic humans at some point and 54% expected to see it happen in the next decade.

So youths have clear views on how a robot/human society might work and indeed many would like to take advantage. A notable proportion of youths – highest in the 11-14 year-old age range – would like to invent a robot as intelligent as a human. This reflects a desire for more education in AI and robotics so a career inventing intelligent machines might be an option, and potentially a lucrative one at that.

Do you think voice technology will be so advanced that people will not be able to tell whether they are talking to a robot or a human? If so, when?

55% — Within the 10 years

34% — Within the 20 years

11% — It will never happen
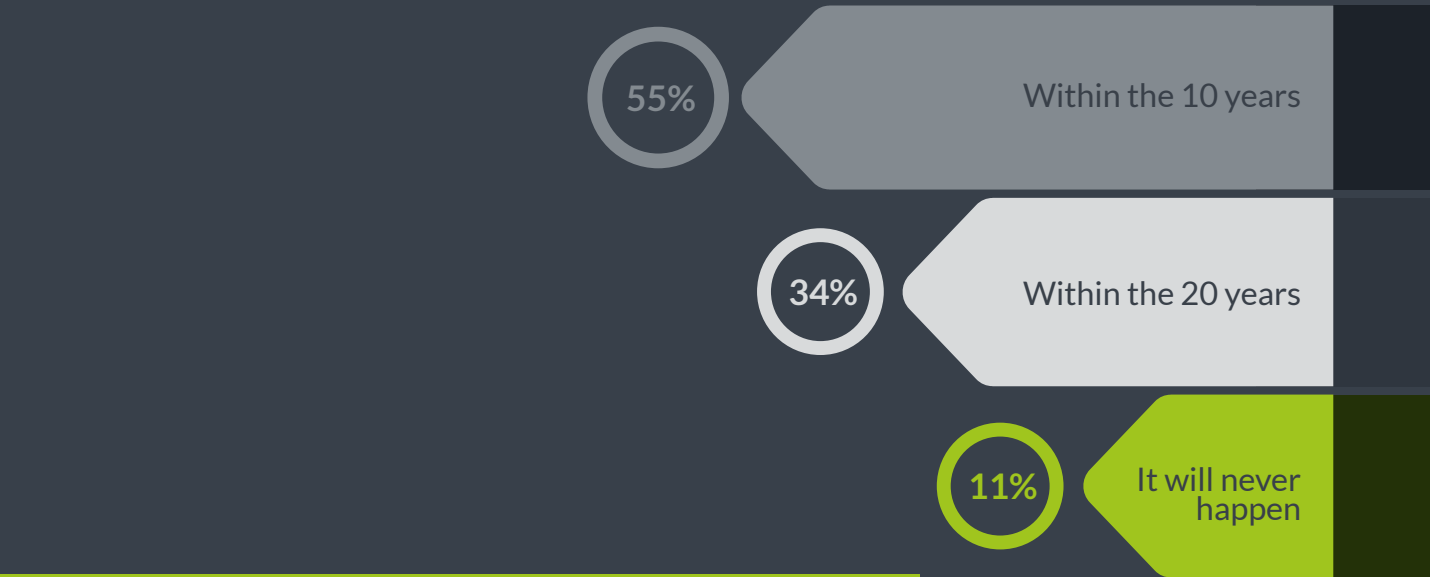
In the future, robots may be able to think and act like humans. If you could, would you like to invent a robot that was as intelligent as a human? % Yes

11-12 — 72%

17-18 — 41%
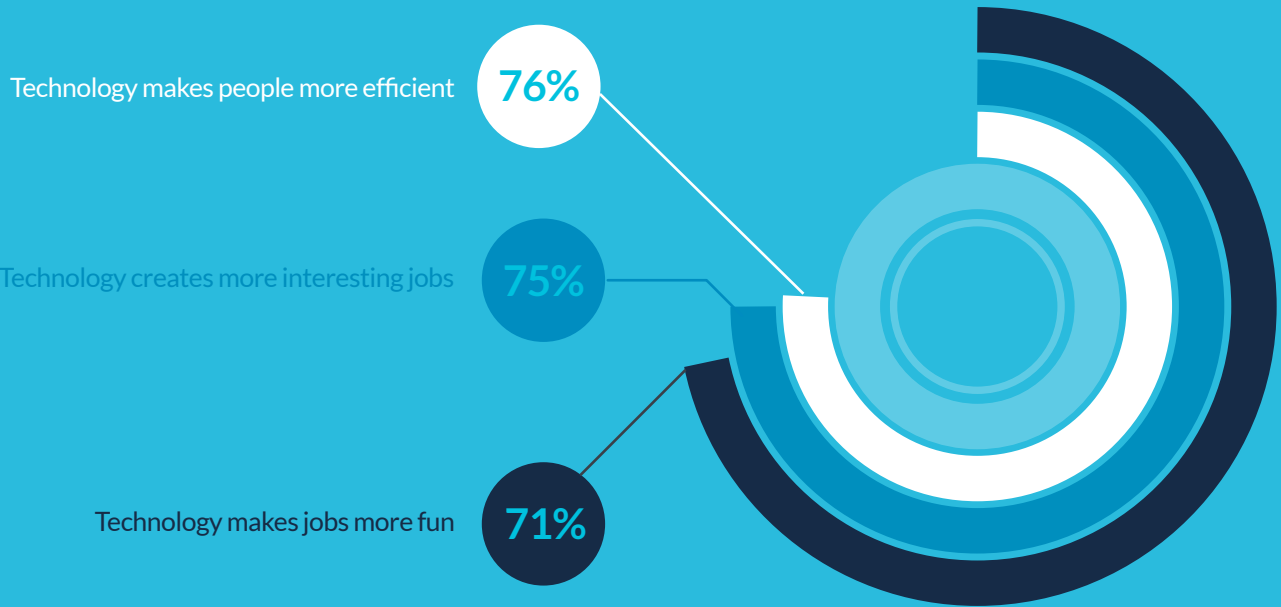
13-14 — 64%

15-16 — 50%

A Positive Impact

Opinion is divided widely on whether job creation caused by technological advancement and robotic workforces will override losses caused by the same advances. However, youths are overwhelmingly positive about the benefits to the future workplace of more embedded technology. This is driven by expectations of greater efficiencies, as well as the creation of more interesting and fun jobs.
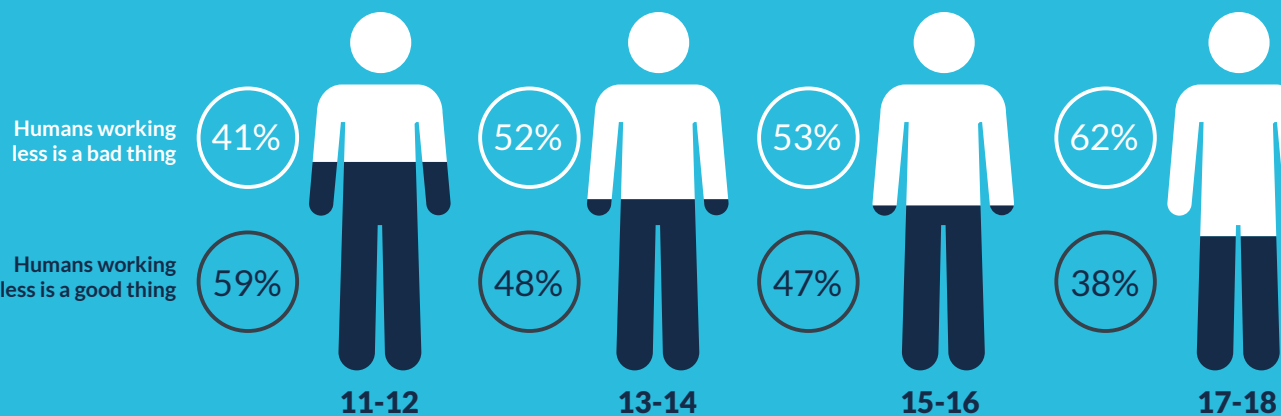
81% of youths agree that technology will give people more free time.

In recognizing the impact technology can have on job efficiency, 81% of youths agree that advances will give people more free time. This will allow additional time for leisure, being with family and generally enjoying themselves. As a result, most young people feel a lighter technology-driven working week will have a positive impact on people and society. However, some skepticism exists among 17-18 year-olds who are worried about increased laziness and potentially lower incomes.

% agree with following statements

Technology makes people more efficient **76%**

Technology creates more interesting jobs **75%**

Technology makes jobs more fun **71%**

Is the idea of humans having to work less a good or a bad thing?

	11-12	13-14	15-16	17-18
Humans working less is a bad thing	41%	52%	53%	62%
Humans working less is a good thing	59%	48%	47%	38%

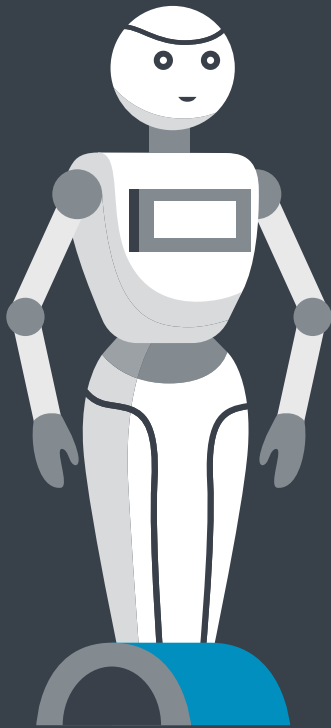Youths recognize the potentially profound impact technology may have on the workplace.

Robotic Friends Becoming Real Friends

Our results indicate that young people want to interact with socially beneficial robots and they support the creation of robots that help people deal with loneliness and look after elderly people. This finding mirrors earlier polling of the adult population where 71% of respondents said they could grow to trust AI devices to the point where they might replace some human relationships.

Robotic Doctors

While the idea of robots being used for companionship is well-received, there is some concern about this being taken too far. Opinion is divided on whether robots should be used as medical doctors, though a strong minority (44%) of youths said they would be open to being operated on by a robot. They way forward may therefore be to augment medical doctors' abilities through a partnership with robotic and/ or AI device – for example, an AI assessment of a patient's X-ray results that is cross-checked by a human clinician before a final diagnosis is agreed.

Would you like robots to...?
% Yes, I would like that

74% Help people combat loneliness

63% Look after your parents when they are very old

62% Be your friend/companion

58% Comfort you when you are sad

52% Diagnose your illness/injury

47% Treat you in hospital

44% Perform an operation on you
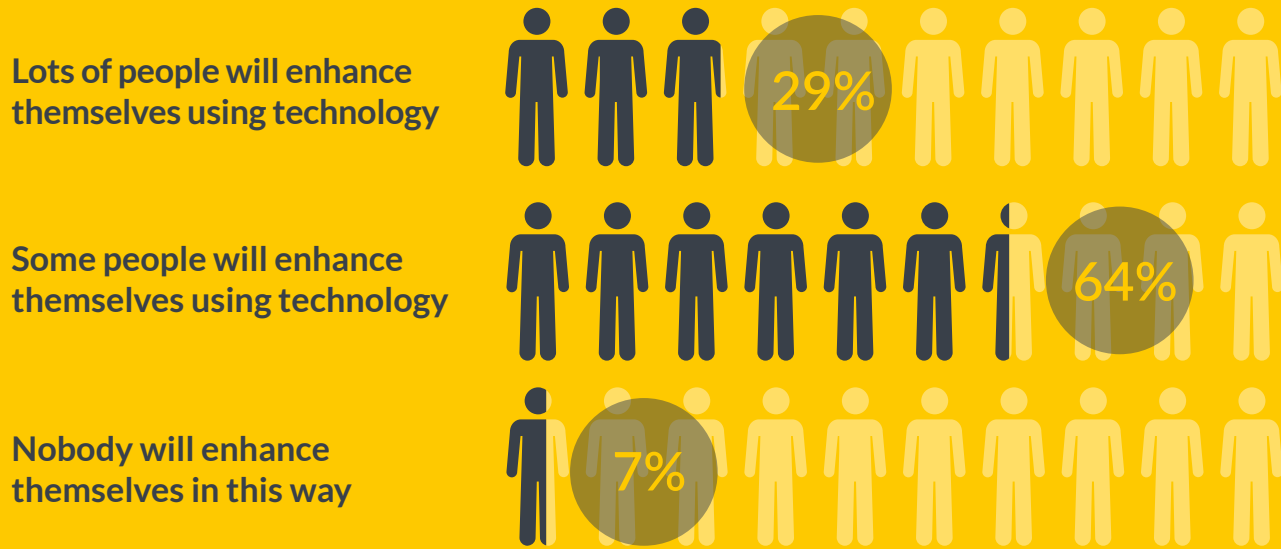
Human Enhancement

Another potential robotics innovation area is human enhancement. Tesla Founder Elon Musk argues we are "already cyborgs" because we use "machine extensions" of ourselves such as smartphones and computers. But in the future, he thinks there will be "a greater integration between man and machine, specifically altering our brains with technology to make them more computer-like".

Young people tend to agree with Musk, seeing technology enhancement as something that might become common-place in the way that plastic surgery is today.

Not only do youths see technological enhancement for humans as possible, they seem captivated by the idea. Around 60% of respondents say they're more excited than concerned about robotic-style enhancements offered to people who want to boost their natural abilities. This positivity is strongest among younger children, with 68% of 11-12-year olds "excited" by the prospect of human robotic enhancements as opposed to 51% of 17-18-year olds.

✛

68% of 11-12-year olds are "excited" by the prospect of human robotic enhancements.

How commonplace do you think technological enhancements for people will become in your lifetime? (e.g. improve a person's appearance, improve eyesight, improve memory, make people more intelligent, make people stronger, taller etc.)

Lots of people will enhance themselves using technology   29%

Some people will enhance themselves using technology   64%

Nobody will enhance themselves in this way   7%

Some people are excited about the possibility for humans to enhance themselves / make themselves better, others are concerned. What do you think?

EXCITED   68%   63%   58%   51%

CONCERNED   32%   37%   42%   49%

11-12   13-14   15-16   17-18
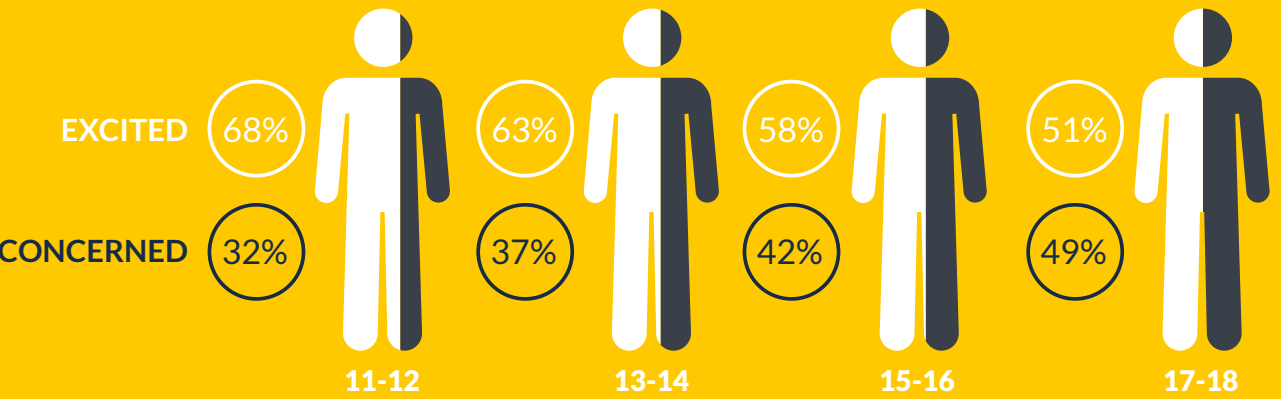
Longer, Healthier Lives

Whether robots replace doctors or humans veer towards a cyborg existence, emerging technologies have the potential to have a profound impact on human health. Youths recognize this with 63% expecting to live healthier lives than their parents.

This is reflected in expectations for the average human lifespan in 50 years' time, with an average prediction of 93 years old agreed upon by survey respondents. There are many reasons to think that this may be achievable by 2070 if the potential for biotechnology, nanotechnology and technology-enhanced precision medicine is realized. However, young people recognized there would be ripple effects to living longer which was reflected in their expectation that the average retirement age could increase to 73 years old.

This elevated retirement age would still give people retiring in 2070 many more years of healthy living than people can expect today. And if our survey respondents are right and robotic enhancements do become commonplace, then who knows what we all might achieve in those twilight years.

63%
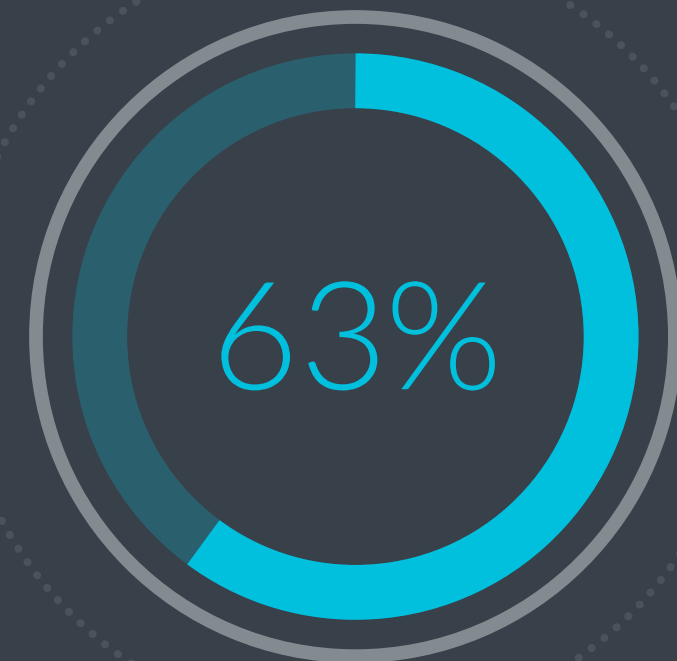
Agree that technology will mean they live a healthier life than their parents' generation

Arm Youth Technology Survey

Emma Yang
(Gen Arm 2Z Ambassador – 15)
Adrian Yang (Father)

" The results of the study show the versatility of technology, especially social media and the internet, allows it to be a positive and a negative influence, helping with learning and social connections but also potentially dragging a young person down and causing them to waste time and effort. I think young people, because of the wide range of uses of the Internet we are exposed to, are aware of both the good and the bad impacts of technology and the study is helpful as it shows that we need to take more steps towards exposing young people to positive technology habits on social media platforms. "

Avye Couloute, (Gen Arm 2Z Ambassador – 11)
Helene Virolan, Phil Couloute (Parents)

" I think it's cool that other young people think that AI & robotics will be important school-based subjects. "
– Avye Couloute

" It's very encouraging, that in the main, young people possess an enviable optimism in relation to technology and their future lives. Robot recruiters! Then perhaps, goodbye to bias! "
– Helene Virolan & Phil Couloute

Samaira Mehta
(Gen Arm 2Z Ambassador – 10)

" Coding is a superpower! I visualize a time that is not too far when robots are taking workshops and empowering kids in every corner of the world to start coding. "

Reuben Paul
(Gen Arm 2Z Ambassador – 13)
Mano & Sangeetha Paul (Parents)

" The increase in access to social media and technology can make cyber addiction and cyber bullying more common for youth. But these are not really technology challenges, they're more user awareness issues. Educating my generation about how to safely and positively use technology for the benefit of humanity is the starting point to solve these problems. "
– Reuben Paul

" It is imperative for school systems to create personalized learning environments for our youth to learn new and emerging technologies so that they can be successful as innovators and take the mantle of technological leadership from our generation to theirs. "
– Mano & Sangeetha Paul