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Public & Social Sector Practice

Defining the skills citizens will need in the future world of work

To future-proof citizens' ability to work, they will require new skills—but which ones? A survey of 18,000 people in 15 countries suggests those that governments may wish to prioritize.

by Marco Dondi, Julia Klier, Frederic Panier, and Jörg Schubert

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We know that digital and AI technologies are transforming the world of work and that today's workforce will need to learn new skills and learn to continually adapt as new occupations emerge. We also know that the COVID-19 crisis has accelerated this transformation.[1] We are less clear, however, about the specific skills tomorrow's workers will require.

Research by the McKinsey Global Institute has looked at the kind of jobs that will be lost, as well as those that will be created, as automation, AI, and robotics take hold. And it has inferred the type of high-level skills that will become increasingly important as a result.[2] The need for manual and physical skills, as well as basic cognitive ones, will decline, but demand for technological, social and emotional, and higher cognitive skills will grow.

Governments are keen to help their citizens develop in these areas, but it is hard to devise curricula and the best learning strategies without being more precise about the skills needed. It is difficult to teach what is not well defined.

We, therefore, conducted research that we hope will help definitions take shape and could contribute to future-proof citizens' skills for the world of work.[3] The research identified a set of 56 foundational skills that will benefit all citizens and showed that higher proficiency in them is already associated with a higher likelihood of employment, higher incomes, and job satisfaction.[4]

Defining foundational skills for citizens

Some work will, of course, be specialized. But in a labor market that is more automated, digital, and dynamic, all citizens will benefit from having a set of foundational skills that help them fulfill the following three criteria, no matter the sector in which they work or their occupation:

— add value beyond what can be done by automated systems and intelligent machines

— operate in a digital environment

— continually adapt to new ways of working and new occupations

We used academic research and McKinsey's experience in adult training to define what these foundational skills might be (Exhibit 1). We started from four broad skill categories—cognitive, digital, interpersonal, and self-leadership—then identified 13 separate skill groups belonging to those categories.[5] Communication and mental flexibility are two skill groups that belong to the cognitive category, for example, while teamwork effectiveness belongs to the interpersonal category.

Looking for still more precision, we identified 56 distinct elements of talent (DELTAs) that fall within these skills groups. We call them DELTAs, rather than skills, because they are a mix of skills and attitudes. "Adaptability" and "coping with uncertainty" are attitudes, for example.[6]

[1] "How COVID-19 has pushed companies over the technology tipping point—and transformed business forever," October 5, 2020, McKinsey.com.
[2] For more information, see "Skill shift: Automation and the future of the workforce," May 23, 2018, on McKinsey.com.
[3] For previous McKinsey work on the role of governments in adapting to the future of work, see Marco Dondi, Solveigh Hieronimus, Julia Klier, Peter Puskas, Dirk Schmautzer, and Jörg Schubert, *A government blueprint to adapt the ecosystem to the future of work*, February 7, 2020, McKinsey.com.
[4] The research was conducted in 2019.
[5] To drive toward a more detailed definition of future skills required, we found it useful to divide the social and emotional category used by the McKinsey Global Institute into two separate ones: interpersonal and self-leadership.
[6] A still finer segmentation of each skill group into more DELTAs would be possible. We limited ourselves, however, to DELTAs that require a distinct approach to their development and assessment.

Exhibit 1

Our research identified 56 foundational skills that will help citizens thrive in the future of work.

56 DELTAS[1] across 13 skill groups and four categories

[1]Distinct elements of talent.

DELTA proficiency and outcomes

From here, we conducted two further pieces of research. First, we sought to gauge the level of proficiency in the 56 DELTAs among today's workers compared with the level we believe will be required to future-proof citizens' ability to work. Second, we sought to gauge whether proficiency in these DELTAs was already associated with certain work-related outcomes.

Overall, survey participants with a university degree had higher average proficiency scores across 56 distinct elements of talent, suggesting that those with higher levels of education are better prepared for changes in the workplace.

Proficiency

To ascertain proficiency levels, we defined a desirable level of proficiency in each of the 56 DELTAs (see appendix for details), then devised a psychometric questionnaire to assess respondents' proficiency against this bar. Eighteen thousand people from 15 countries completed the online questionnaire and were given a score on a scale of 0 to 100 for each DELTA (see the sidebar, "Example: Evaluating proficiency levels for DELTAs").

The results showed respondents' proficiency was lowest in two skill groups in the digital category—software use and development and understanding digital systems. Proficiency in the skill groups for communication and planning and ways of working—both in the cognitive category—was also lower than average (Exhibit 2).

We also examined whether proficiency was linked to education. Overall, survey participants with a university degree had higher average DELTA proficiency scores than those without, suggesting—perhaps not surprisingly—that participants with higher levels of education are better prepared for changes in the workplace. However, a higher level of education is not associated with higher proficiency in all DELTAs. The association holds true for many

Example: Evaluating proficiency levels for DELTAs

To assess respondents' proficiency levels for each DELTA, we gave them three different sentences that described certain behaviors, choices, and preferences in different situations. Respondents were asked to choose the sentence that best described themselves, even though none or more than one might be relevant. Each sentence was associated with a different level of proficiency. (To learn more about our assessment methodology, refer to the appendix at the end of this article.)

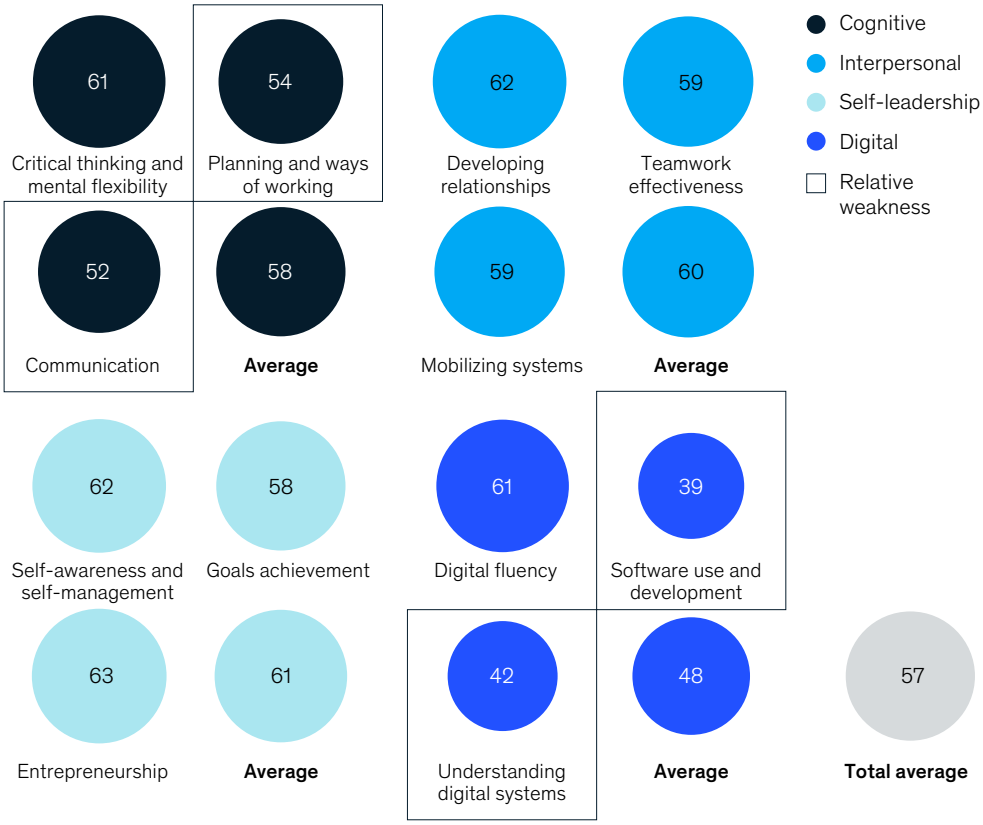
For example, here are the options we provided to gauge efficiency in the "structured problem solving" DELTA (within the critical thinking skill group):

- Option 1: I can solve day-to-day problems easily, but I often need assistance with complex problems
- Option 2: I can break larger problems into parts and find solutions for them
- Option 3: I routinely break complex problems down into parts, identify their causes, and find solutions

Exhibit 2

Respondents' proficiency was lowest in two skill groups in the digital category—'software use and development' and 'understanding digital systems.'

DELTA[1] by category and skill group, all countries, average score[2]



Note: The margin of error is 1% with a 95% confidence interval. Averages are computed as the mean of country averages and not of all respondents' averages.
[1]Distinct element of talent.
[2]Index score calculation: survey answers for each DELTA were associated with a proficiency level of 1–3, which in turn corresponded with a score of 0–100. The index for each aggregation is calculated as the average of the answers for each DELTA within the skill group.

DELTAs in the cognitive and digital categories. But for many within the self-leadership and interpersonal categories, such as "self-confidence," "coping with uncertainty," "courage and risk-taking," "empathy," "coaching," and "resolving conflicts," there is no such association.[7] For some DELTAs, more education was associated with lower proficiency, "humility" being an example.

Exhibit 3 lists the DELTAs where proficiency has the highest and lowest correlation with the level of education. (Some have a negative coefficient.)

Outcomes

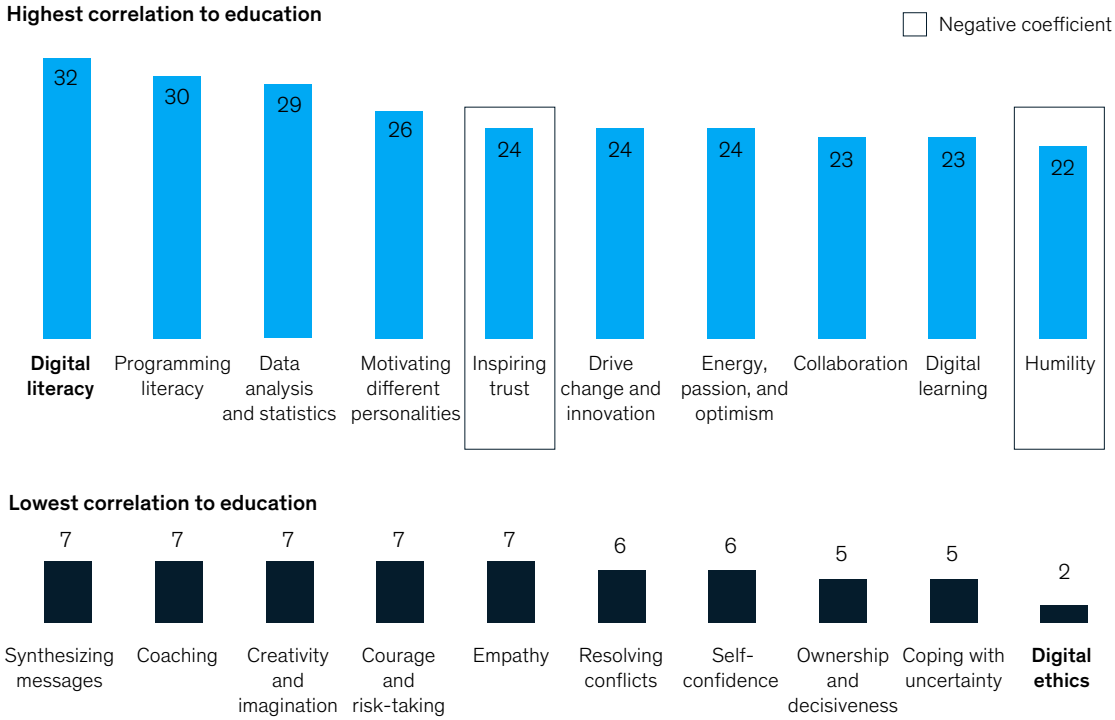
We went on to test whether proficiency in the DELTAs was already helping people in the world of work; the results showed that survey respondents

[7]Predictive models based on three different statistical techniques failed to find a correlation.

Exhibit 3

Proficiency in certain DELTAs is not necessarily linked to education.

Accuracy of statistical models predicting DELTA[1] proficiency from level of education,[2]
percentage points above pure chance of 33% (3 proficiency levels, value of 0 = pure chance)



[1]Distinct element of talent.
[2]Three statistical models used: linear discriminate analysis, multinomial logistic regression, and ordinal logistical regression. For each DELTA, the figures displayed are from the statistical model that showed the highest predictive accuracy.

with higher DELTA proficiencies were, on average, more likely to be those that were employed, with higher incomes, and higher job satisfaction. Different DELTAs were more strongly associated with these three work-related outcomes, however.

Holding all variables constant—including demographic variables and proficiency in all other elements—we found employment was most strongly associated with proficiency in several DELTAs within the self-leadership category, namely "adaptability," "coping with uncertainty," "synthesizing messages," and "achievement orientation" (Exhibit 4, part 1).[8]

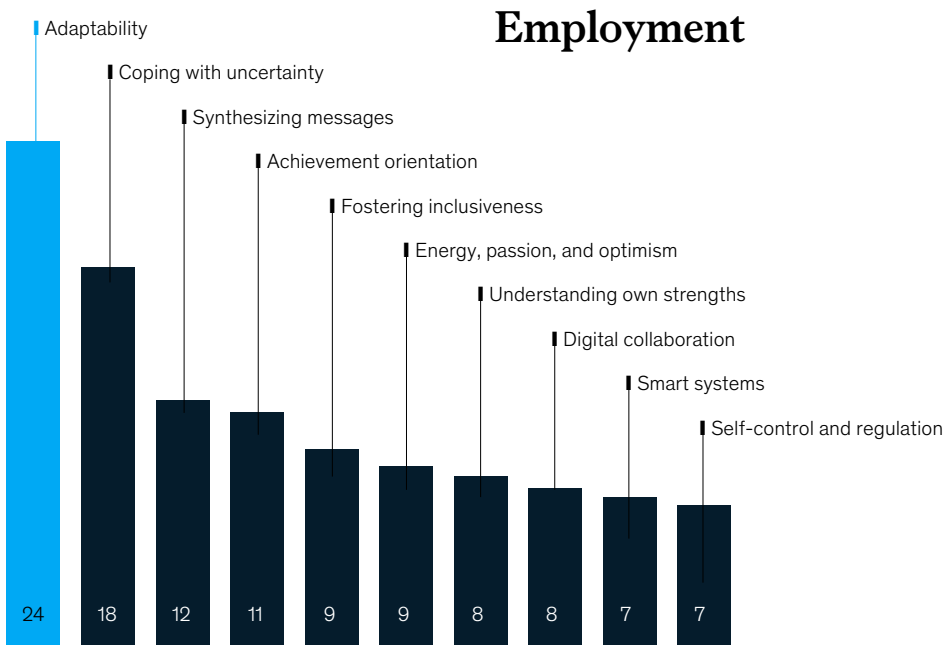
High incomes were most strongly associated with proficiency in the four skill groups where overall proficiency levels were lowest among respondents—namely understanding digital systems, software use and development, planning and ways of

[8]These DELTAs were selected based on their individual contribution—holding all other variables constant—to the probability of a survey participant being employed among those whose income was below the median or those with no income. People with income above the median were excluded to avoid skewed results because of their higher proficiency in DELTAs.

Exhibit 4, part 1

Proficiency in certain DELTAs is linked with higher likelihood of employment.

Increased chance of respondents with a higher proficiency in the DELTA[1] being employed,[2] %



Note: The margin of error is 3% with a 95% confidence interval. DELTAs selected based on individual contribution—holding other variables constant—to the probability of a survey participant being employed among those with income below the median or those with no income. People with income above the median were excluded to avoid skewed results because of higher proficiency in DELTAs.
[1]Distinct element of talent.
[2]Increase in the odds of being employed if proficiency score is higher by 1 level, assuming all other elements and demographic variables are fixed/constant. Only OECD countries included in this analysis.

working, and communication (the first two fall within the digital category and the latter two within the cognitive category).[9]

Digital proficiency seems to be particularly associated with higher incomes: a respondent with higher digital proficiency across all digital DELTAs was 41 percent more likely to earn a top-quintile income than respondents with lower digital proficiency.[10] The equivalent comparison was 30 percent for cognitive DELTAs, 24 percent for self-leadership DELTAs, and 14 percent for interpersonal DELTAs.

That said, the four DELTAs most strongly associated with high incomes were "work-plan development" and "asking the right questions," both in the cognitive category; "self-confidence," a self-

[9] These skill groups show the largest difference in proficiency between survey participants with income below the median income in their country and those in the top quintile.
[10]Our assessment model had three levels of proficiency (3 being the highest level) for each of the 56 DELTAs. Here, respondents with higher digital proficiency are those judged to be at level 3. Those with lower digital proficiency are those at level 2. All else being constant, a respondent at level 3 is 41% more likely to be earning a top-quintile income than a respondent at level 2.

leadership DELTA; and "organizational awareness," an interpersonal DELTA (Exhibit 4, part 2).[11]

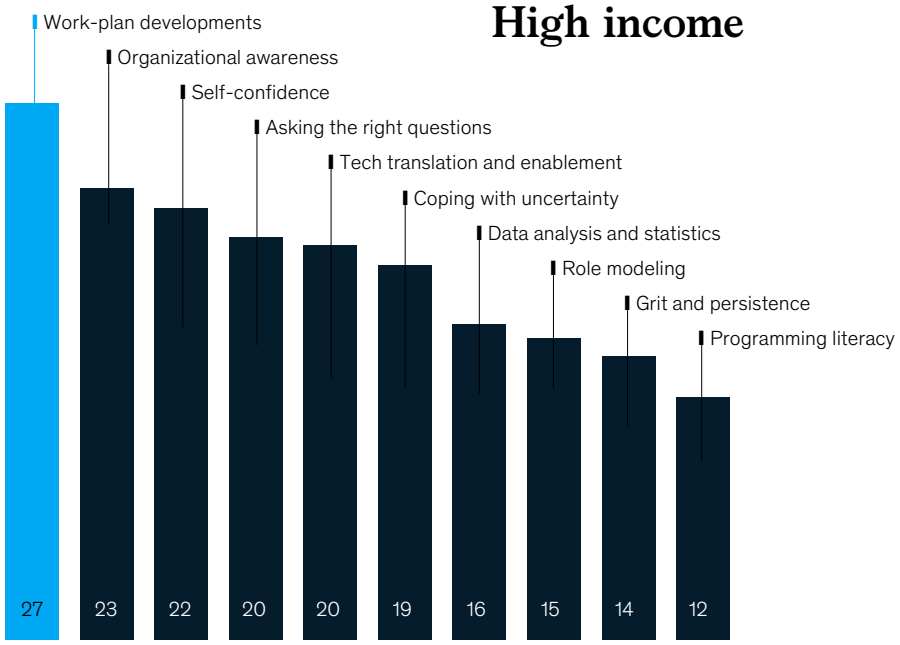
Job satisfaction is also associated with certain DELTAs, especially those in the self-leadership category. Holding all variables, including income, constant, "self-motivation and wellness," "coping with uncertainty," and "self-confidence," had the highest impact on respondents' job satisfaction (Exhibit 4, part 3).[12]

Notably, proficiency in two self-leadership DELTAs—"self-confidence" and "coping with uncertainty"—ranked among the top three most predictive DELTAs for two out of the three outcomes (Exhibit 5).

Exhibit 4, part 2

Proficiency in certain DELTAs is linked with higher income.

Increased chance of respondents with a higher proficiency in the DELTA[1] earning high income,[2] %



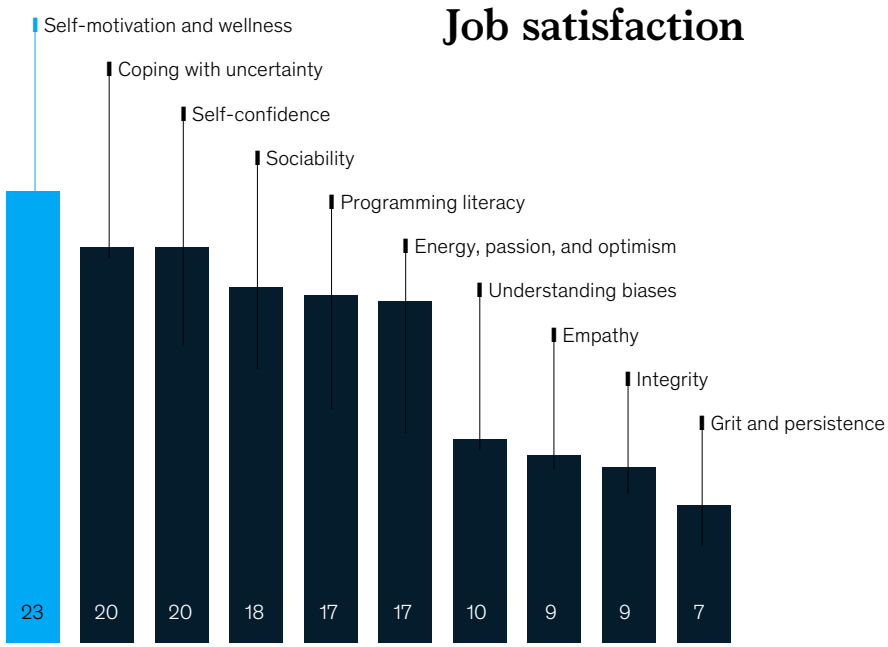
Note: The margin of error is 3% with a 95% confidence interval. These skill groups show the largest difference in proficiency between survey participants with income below the median income in their country and those in the top quintile.
[1] Distinct element of talent.
[2] Increase in the odds of being in the top quintile for income if proficiency score is higher by 1 level, assuming all other elements and demographic variables are fixed/constant. Only OECD countries included in this analysis.

[11] These DELTAs were selected based on their individual contribution—holding all other variables constant—to the probability of a survey participant being in the top quintile for income.
[12] These DELTAs were selected based on their individual contribution—holding all other variables constant—to the probability of a survey participant being either "fulfilled and satisfied" or "satisfied" with their job, as opposed to "somewhat satisfied" or "dissatisfied."

Exhibit 4, part 3

Proficiency in certain DELTAs is linked with higher job satisfaction.

Increased chance of respondents with a higher proficiency in the DELTA[1] having job satisfaction,[2]%



Note: The margin of error is 3% with a 95% confidence interval.
[1]Distinct element of talent.
[2]Increase in the odds of being "fulfilled and satisfied" or "satisfied" with job, rather than unsatisfied, if proficiency score is higher by 1 level, assuming all other elements and demographic variables are fixed/constant. Only OECD countries included in this analysis.

How DELTAs could help shape education and adult training

Our findings help define the particular skills citizens are likely to require in the future world of work and suggest how proficiency in them can influence work-related outcomes, namely employment, income, and job satisfaction. This, in turn, suggests three actions governments may wish to take.

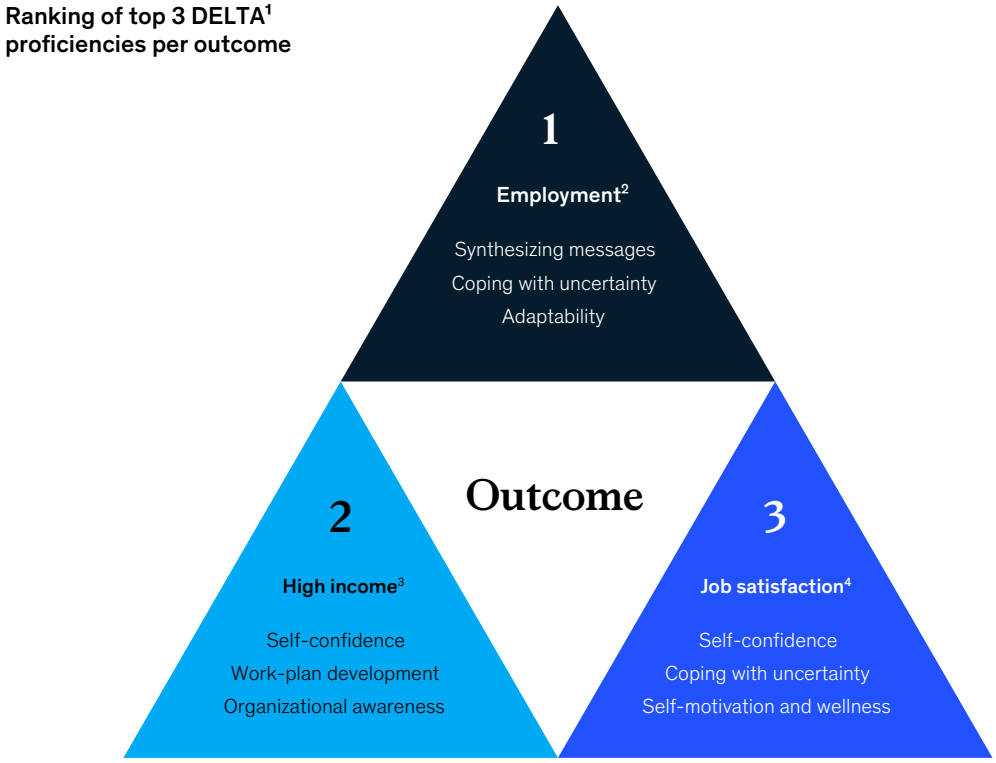
Reform education systems

Our research suggests governments could consider reviewing and updating curricula to focus more strongly on the DELTAs. Given the weak correlation between proficiency in self-leadership and interpersonal DELTAs and higher levels of education, a strong curricula focus on these soft skills may be appropriate.

Governments could also consider leading further research. Many governments and academics have started to define the taxonomies of the skills citizens will require, but few have done so at the level described here. Moreover, few, if any, have undertaken the considerable amount of research required to identify how best to develop and assess such skills. For instance, for each DELTA within the curriculum, research would be required to define progression and proficiency levels achievable at different ages and to design and test developmental strategies and assessment models. The solutions for different DELTAs are likely to

Exhibit 5

We ranked the top three DELTAs in which proficiency predicts better outcomes for employment, high income, and job satisfaction.



Note: Data from non-OECD countries presented higher variance and were excluded from this analysis.
[1]Distinct element of talent.
[2]Probability of a survey participant being employed among citizens with income below the median.
[3]Probability of a survey participant being in the top quintile for income.
[4]Probability of a survey participant reporting being "fulfilled and satisfied" or "satisfied" with his/her job.

differ widely. For example, the solutions to develop and assess "self-awareness and self-management" would differ from those required for "work-plan development or "data analysis."

In addition, governments could consider setting up institutions for research and innovation in education to fund the research, facilitate researchers' access to schools to test innovative solutions, and establish which methods work for which DELTAs. They could also make the emerging data and insights available to researchers and educators in the private sector.

Reform adult-training systems

The majority of respondents we surveyed—like the majority of people in society at large—were no longer in national education systems. Raising proficiency in the DELTAs would therefore require continuous adult training. The fact that proficiency in digital DELTAs—shown to improve the chances of achieving higher incomes—was lower among older survey respondents who had left the national educational system illustrates this point.

The curricula of adult-training courses may also have to change. For example, our research has

shown that self-leadership DELTAs may be particularly important for employment outcomes, yet these are not commonly covered by adult-training programs. For example, in an online scan of adult-training programs, we found that courses or modules to develop DELTAs within the skill groups of goal achievement or self-awareness and self-management were 20 times less common than those to develop communication DELTAs. That could be an urgent gap to fill to adequately respond to the wave of unemployment caused by the COVID-19 pandemic.

Specific actions that might encourage relevant adult learning include the following:

— *Establish an AI aggregator of training programs to attract adult learners and encourage lifelong learning.* AI algorithms could guide users on whether they need to upskill or reskill for a new profession and shortlist relevant training programs. To develop accurate algorithms, governments would need to collect and organize data on market demand for jobs and skills, as well as data on training programs. Programs listed should include those that teach DELTAs correlated to work-related outcomes. Self-leadership DELTAs could be particularly important given their link to employment.

— *Introduce a skill-based certification system.* Occupation-based qualifications risk becoming outdated rapidly as occupations requiring new skills emerge. Hence, skills-based accreditation may better suit employers' needs. Providers could develop programs that cover the practical skills and DELTAs required to perform a certain occupation, but add new components or remove old ones as those occupations evolved. Several AI start-ups have developed algorithms capable of identifying and updating the skill sets required for different occupations. Governments could adapt these to enable a dynamic, skill-based certification system.

— *Fund schemes that encourage a higher focus on DELTAs.* Some governments award lifelong learning grants to their citizens, who can enroll in training programs within a national aggregator. To help equip citizens for the future world of work, governments could funnel funds toward programs that include the DELTAs associated with employment. For example, trainees could be offered spending vouchers for particular programs only, while funding to program providers could be conditional upon employment outcomes or the provision of training modules that include certain DELTAs.

Ensure affordability of lifelong education

Most children around the world have access to primary and secondary schooling, but not all of it is of high quality, and early education for the very young—the best age at which to develop certain mindsets and attitudes—is unaffordable for most people in most countries. In addition, very few countries have worked out a system to provide affordable access to quality adult training.

Hence, just as the Industrial Revolution in the 19th century drove an expansion of access to education, today's technological revolution should drive further expansion to ensure universal, high-quality, affordable access to education from early childhood to retirement and to ensure that curricula include the DELTAs that will future-proof citizens' skills in the world of work.

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Appendix: Definitions and methodology

1. Definitions and calibration

Cognitive			
Skill group	Element	Definition	Desired proficiency level
Communication	Active listening	The ability to be present, remember what is being said, and acknowledge it in following conversations and decisions	In a conversation, individuals are present, remember what is said, understand others' motivations and needs, and considers these in the future
	Asking the right questions	The ability to ask questions that elicit relevant information from others and that can create or break consensus in a debate	In a conversation, individuals think of possible questions and ask those that would best move the discussion forward
	Storytelling and public speaking	The ability to convey to all types of audiences the desired messages and emotions through word choice, tone, and gestures	Individuals adapt word choice, tone, and speed of speech depending on the messages and emotions they want to convey to different audiences, large or small
	Synthesizing messages	The ability to communicate a large amount of information concisely and insightfully	Individuals are able to synthesize a large amount of information into short messages that provide only those relevant insights that have an impact on the future
Critical thinking	Logical reasoning	The ability to draw logical conclusions based on facts, statements, or arguments and to identify the strengths and weaknesses of those arguments	Individuals are able to draw sound conclusions from facts and assess the strength of others' arguments
	Seeking relevant information	The ability to identify the information and facts needed to draw a conclusion	Individuals can assess whether known facts and information are sufficient to draw a conclusion and can identify missing information

Cognitive (continued)			
Skill group	Element	Definition	Desired proficiency level
Critical thinking	Structured problem solving	The ability to solve difficult problems with nonobvious solutions (for example, climate change) by breaking them down into simpler parts	When faced with complex problems, individuals are able to break them down into parts, identify root causes of each part, and find solutions
	Understanding biases	The ability to recognize when possibly irrelevant, preexisting patterns affect our thinking process	Individuals are aware of biases in their thinking and can usually ensure they do not impair their thought processes and decisions
Mental flexibility	Ability to learn	The ability to learn new topics both within and outside formal learning programs	Individuals can quickly and independently learn competencies beyond their area of expertise
	Adaptability	The ability to be open to changing the way of doing things even if it requires effort or learning new skills	Individuals easily adapt to new situations or ways of working, even when new skills are required
	Adopting a different perspective	The ability to adopt others' perspectives in their use of products and services	When saying, giving, or designing something, individuals consider how diverse recipients may react or use a product in various situations and contexts
	Creativity and imagination	The ability to use imagination to generate ideas, concepts, products, or ways of working that are both original and valuable	Individuals regularly imagine new ideas, concepts, procedural steps, and products, without being asked to be creative
	Translating knowledge to different contexts	The ability to identify situations where knowledge can be applied in a different context	Individuals can apply knowledge or experience from one area to understand topics and create ideas in other contexts
Planning and ways of working	Agile thinking	The ability to work iteratively, continually testing assumptions and prototypes to create an effective solution swiftly and to constantly improve and adapt in changing circumstances	Individuals are comfortable testing imperfect concepts and continually iterating solutions
	Time management and prioritization	The ability to identify urgent and important activities, prioritize them appropriately, and choose the most efficient way to complete them	Individuals prioritize activities daily, assesses their importance and urgency, and allocate time accordingly
	Work-plan development	The ability to identify, group, and sequence the tasks needed to achieve a certain goal and to assign deadlines and responsibilities	Individuals are able to identify all project activities, the critical path, and interdependencies and assign deadlines accordingly

Digital			
Skill group	Element	Definition	Desired proficiency level
Digital fluency and citizenship	Digital collaboration	The ability to collaborate effectively through digital channels, including email, videoconference, file-sharing platforms, and other messaging applications	Individuals use various digital channels to work with colleagues and are capable of picking the most suitable ones
	Digital ethics	The ability to understand how ethics translate to the digital world	Individuals understand that digital interactions and tools have ethical impacts (for example, privacy, accountability, algorithm bias) and can take extra measures to avoid creating harm to themselves or others
	Digital learning	The ability to develop valid knowledge of selected subject areas from a broad range of digital information	When seeking to learn something, individuals can draw upon online resources, knowing how to identify the most reliable sources
	Digital literacy	The ability to handle digital data, use popular software, access digital services, and interact with AI	Individuals regularly use the internet, access services digitally, use popular software, and understand that online activity creates data that others can use
Software use and development	Computational and algorithmic thinking	The ability to translate real problems into models or algorithms that people and computers can more easily process	Individuals are able to convert real-world problems into a model or algorithm
	Data analysis and statistics	The ability to analyze large volumes of data using complex analytical methods to generate statistically robust insights	Individuals are able to analyze large sets of data and use statistical models to draw conclusions or make predictions
	Programming literacy	The ability to understand the principles of software development and coding	Individuals are familiar with the principles of software development and can understand basic code
Understanding digital systems	Cybersecurity literacy	The ability to protect IT systems from unauthorized access as well as proactively avoid threats and devise crisis-management plans	Individuals understand hacker strategies, foresee which data hackers might want, and take precautions to avoid threats
	Data literacy	The ability to understand the processes and alternative strategies for data creation, collection, validation, and storage	Individuals are able to understand how data are created, collected, validated, and stored
	Smart systems	The ability to use smart devices to improve the efficiency of day-to-day activities	Individuals understand how smart devices can be used to improve a product or process
	Tech translation and enablement	The ability to act as a bridge between technology experts and business experts or customers	Individuals identify opportunities to deploy new technologies, can build business cases for them, and can explain benefits to users or business owners

Interpersonal			
Skill group	Element	Definition	Desired proficiency level
Developing relationships	Empathy	The ability to understand and share the feelings of another	Individuals understand how different personalities feel and react in various circumstances and make others feel better through appropriate actions and behaviors
	Humility	An attitude of letting one's accomplishments speak for themselves, without seeking the spotlight or holding oneself in overly high esteem	Individuals are aware of their accomplishments but let them speak for themselves and consider themselves as a small part of a larger team
	Inspiring trust	The ability to inspire trust through reliability, honesty, and genuine concern for the needs and wishes of others	Individuals consider the needs of other human beings to be as important as their own and inspire trust by acting accordingly
	Sociability	The ability and willingness to interact with others with language, tone, facial expressions, and behaviors that convey a sense of comfort and appreciation	Individuals act in a friendly and sociable manner toward others, making them feel comfortable
Mobilizing systems	Crafting an inspiring vision	The ability to develop an ambitious vision that mobilizes people to achieve it	Individuals are able to bring to life an idealized future that inspires a large group of people to realize that vision
	Organizational awareness	The ability to understand how large groups of people can cooperate and coordinate and the ability to navigate organizational procedures	Individuals understand organizational procedures, roles, and decisions—both formal and informal—typically involved in most organizational efforts
	Programming literacy	The ability to understand the principles of software development and coding	Individuals are familiar with the principles of software development and can understand basic code
	Role modeling	The ability to role model a certain behavior and generate in others the willingness or desire to emulate it	Individuals adjust behavior in front of others to inspire them to behave similarly
	Win–win negotiation	The ability to explore the interests and needs of others and propose solutions that increase benefits for all parties involved	Individuals approach negotiations by seeking opportunities to increase benefits for all parties involved
Teamwork effectiveness	Coaching	The art of facilitating the performance, learning, and development of another person	Individuals can facilitate the performance, learning, and development of other people, providing constructive feedback and helping them think through alternative ways of doing things
	Collaboration	The ability to strive for collective goals and coordinate effectively to achieve them	Individuals create opportunities for collaboration so that team results exceed the sum of individual contributions

Interpersonal (continued)			
Skill group	Element	Definition	Desired proficiency level
Teamwork effectiveness	Empowering	The ability to delegate activities and decisions while setting expectations and goals	Individuals entrust others with achieving critical goals and hold them accountable for successes or failures
	Fostering inclusiveness	The ability to appreciate diversity and create psychological safety that fosters different points of view and ways of thinking from people of any background and orientation	Individuals appreciate diversity and foster different points of view and ways of thinking from people of any background and orientation
	Motivating different personalities	The ability to understand what motivates people with different personalities and circumstances and use such insights	Individuals understand what motivates people with different personalities and circumstances and use these insights to encourage action
	Resolving conflict	The ability to identify, surface, and solve a conflict in a way that is conducive to both progress and good team dynamics	Individuals consider disagreement to be normal and tend to identify and address potential conflicts

Self-leadership			
Skill group	Element	Definition	Desired proficiency level
Entrepreneurship	Breaking orthodoxies	The ability to identify and expose situations where orthodoxies and conventional wisdom may hinder progress	Individuals often challenge conventional wisdom and orthodoxies and show alternative views or paths that may lead to progress
	Courage and risk-taking	The ability to take risks in the hope of great achievement, notwithstanding uncertainty and potential loss	Individuals are willing to take risks, if necessary, to achieve something great, even in the face of uncertainty and potential loss
	Driving change and innovation	The attitude of aiming for continuous improvement through innovation	Individuals believe that there is always a better way to do things and continuously strive for innovation and improvement
	Energy, passion, and optimism	The ability to keep a positive attitude and gain energy by pursuing a challenging goal	Individuals are able to keep a positive attitude and find the energy to face challenges and complexity
Goals achievement	Achievement orientation	The ability to distinguish ends and means and change the strategy to achieve goals	Individuals always distinguish ultimate goals from the means to achieve them and can change strategy to achieve those goals
	Coping with uncertainty	The ability to operate effectively in situations with high uncertainty or when things do not go according to plan	Individuals consider uncertainty to be the default state and keep operating effectively, unaffected by unexpected changes

Self-leadership (continued)			
Skill group	Element	Definition	Desired proficiency level
Goals achievement	Grit and persistence	The ability to persevere despite obstacles	Individuals are able to persevere in their pursuits, expecting setbacks and obstacles and overcoming them to achieve goals
	Ownership and decisiveness	The attitude of feeling responsible for achieving an outcome, taking decisions and actions that drive progress without delays	Individuals feel responsible for achieving outcomes, understand how their work fits into the work of others, and make decisions to move things forward
	Self-development	The ability to reflect on personal performance and seek feedback from others to continuously improve	Individuals continuously seek to improve and invite others to provide suggestions and feedback to gain an outside perspective that enriches self-reflection
Self-awareness and self-management	Integrity	The quality of being honest and having strong, steadfast moral principles	Individuals are honest and have strong moral principles that guide them in any situation
	Self-confidence	The quality of trusting in one's abilities, personal characteristics, and judgments	Individuals trust their abilities and judgment and are very self-confident in most situations
	Self-control and regulation	The ability to be rational and control emotions and patterns of behaviors, even in emotionally charged moments	Individuals can control their emotions and habits in a way that they never interfere with their work performance
	Self-motivation and wellness	The ability to maintain high motivation and energy by knowing and pursuing personal long-term goals as well as restorative activities	Individuals know which activities give daily energy and long-term purpose, keeping them motivated
	Understanding own emotions and triggers	The ability to identify situations that trigger an emotional reaction and to understand when and how emotions affect decisions	Individuals know and foresee situations that will trigger emotions affecting their judgment in predictable ways
	Understanding own strengths	The ability to accurately identify areas of personal excellence	Individuals know their strengths so well that they can predict challenges and can succeed even beyond their areas of expertise

2. Assessment methodology and limitations

To assess respondents' proficiency levels for each DELTA, we gave them three different sentences that described certain behaviors, choices, and preferences in different situations. Respondents were asked to choose the sentence that best described themselves, even though none or more than one might be relevant. Each sentence was associated with a different level of proficiency.

To guard against respondents overestimating their proficiency, they were shown the three sentences in random order without knowing which DELTA was being assessed. The sentences were worded to encourage even those with low proficiency levels to select one. For example, the sentence associated with the lowest proficiency in the element "structured problem solving" is: *"I can solve day-to-day problems easily, but I often need assistance with complex problems."*

One of the three sentences was written to match the desired mastery level (see table above) for each DELTA. A respondent selecting this option would receive a score of 100. The other two sentences received a score of 0 or 50.

The limitation of this methodology is country comparability, as meanings may vary somewhat once sentences are translated into different languages, and cultural attitudes to answering long surveys can differ. For example, in non-OECD countries and Mexico, we noticed a higher "noise" among respondents who answered without carefully reading the questions, signaling either lower literacy or lower patience. We discarded any survey completed in less than 20 minutes but still noticed higher noise in some countries, making cross-country comparison difficult.

Another limitation is the precision with which we were able to assess a certain respondent's proficiency in a certain DELTA. We chose breadth over depth—that is, we assessed the proficiency of a large number of respondents but only asked one question for each DELTA. This raises the possibility of a respondent interpreting the question in a particular context and giving an answer not aligned with their overall proficiency shown across different contexts. Notwithstanding, the methodology serves our purposes well—that is, it draws out trends by looking at averages across numerous groups and by looking at a single respondent's average proficiency across all 56 DELTAs. A respondent's misinterpretation of a question becomes less relevant in this context. The methodology would be inadequate, however, as a precise assessment of a single respondent's proficiency in one DELTA.

The overall DELTA score is not an average of averages. The score for each skill group is an average of the DELTAs within the group, the score for each category is the average of the DELTAs within the skill groups for that category, and the overall DELTA score is the average score for all 56 DELTAs.

3. Data collection

The field research was conducted by an external agency using online panels. The survey was anonymous. The composition of the online panels of survey respondents by gender, age (within 18–65 years), education level, income, and, in some cases, ethnicity reflected the demographics of each country. For each country we collected some 1,200 responses, giving a 3 percent margin with a 95 percent confidence interval for the overall results. Aggregated results across all countries have smaller margins of error.

Data were collected over the course of three months (between July and October 2019). Standard quality controls were put in place by the agency, and responses that didn't meet the bar were discarded. We set a minimum time of 20 minutes to complete the survey. This was raised to 30 minutes for countries where noise in the answers was particularly high.

4. Analyses of results

Two methods were used to analyze results. One was to note the difference in scores between different groups of respondents as a gauge of the proficiency levels of certain groups. A second was a statistical analysis to isolate one variable at a time and assess the effect of that variable on a specific outcome.

The statistical model used to assess the relationship between the dependent variables (for example, high income versus low income, low income versus unemployed, satisfied and fulfilled versus somewhat satisfied or dissatisfied) and the independent variables was a binary-logistic-regression model. In such a model, the (log of the) odds for the target variable (for example, the odds of high income versus low income) are modeled as a linear combination of the independent

variables (that is, the categories of elements). This model was selected because it provides insights into the effect of each independent variable on the target variable, in which case obtaining linear combinations of independent variables becomes most helpful. Checks were in place for assumptions that each observation in our data set was independent of others, that the sample size was sufficient, and that the independent variables had a linear relationship with the (log of the) odds for each class in our target variable. The model was developed in the R environment for statistical computing, specifically the *base* library, along with the *broom* and *recipes* libraries for model housekeeping and assessment.

To assess the link between participants' DELTA scores and education levels, we used an ordinal-logistic-regression model and a multinomial-logistic-regression model. The ordinal logistic model was selected to preserve the sense of order in our target variable (for example, university > vocational study > high school > secondary or lower), while the multinomial logistic model was appropriate because the target variable has multiple classes. While a multinomial logistic regression can simply be considered an extension of the binary logistic model, an ordinal logistic model can be considered an extension with an added appreciation for "order" in the target variable. For such an ordinal logistic model, the logit link function was used. For both models, we tested for the presence of multicollinearity. Individually, for the multinomial logistic model, we tested to see that the target classes were not clearly separable via the independent variables, while for the ordinal logistic model, we tested the proportional odds assumption and did not find any suspect trends. Both models were later compared and the ordinal logistic model was chosen for more stable estimates and better prediction results.