Yidan Prize
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WORLDWIDE EDUCATING FOR THE FUTURE INDEX

A benchmark for the skills of tomorrow

Written by The Economist Intelligence Unit

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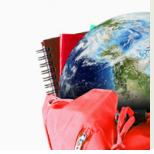

Executive summary

The rapid development of digital technology and the globalised nature of economic systems are creating an entirely new set of educational challenges for the world to adapt to. The workers of the future will need to master a suite of adaptable interpersonal, problem-solving and critical-thinking skills, and navigate an increasingly digital and automated world. This paper presents the results of the first Worldwide Educating for the Future Index , which was created to evaluate the extent to which education systems inculcate such "future skills". The main findings are:

1. **Too many governments are not doing enough to prepare millions of young people for seismic changes in work and life.**

   Millions of young people are not being taught effective and relevant skills, leaving them unprepared for the complex challenges of the 21st century. The performance of various economies in the index indicates substantial room for improvement. Although in general, richer economies do better, many struggle to beat the average, suggesting that more can and should be done.

2. **Crucial areas such as project-based learning and global citizenship are being widely ignored.**

   It is not enough to simply teach traditional subjects well. Education systems need to adopt new approaches that help students learn skills such as critical thinking, collaboration and awareness of global concerns like climate change. Yet only 17 out of the 35 economies indexed offer any kind of assessment framework to test global citizenship skills, and only 15 evaluate project-based learning to some degree.

3. **Policy needs to be complemented by a pool of talented teachers well-equipped to guide students in gaining future skills.**

   An effective system must be built on resourceful and highly capable teachers, who are willing and able to tackle the challenges of preparing students for an ever-evolving and complex future. The index suggests that important strides are already being taken in this area: in most markets, teaching modules stress the importance of future skills to at least some extent. Teacher training is also a particular bright spot: nearly half of the economies surveyed demand teachers hold bachelor's degrees in teaching, and all require at least a university education.

4. **Classroom walls must be broken down.**

   Education must not stop when students step out of the classroom. Teachers and parents need to equip them with the skills and attitudes to apply academic concepts to the outside world. They must see learning as an organic process, not one confined to traditional teaching environments. Study abroad programmes, for example,

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which nearly all economies in the index show support for to some extent, are good conduits for this. The index also indicates that governments are involving the business community in their education systems: all but three economies show some level of university-industry collaboration.

5. **Pay for teachers and adequate funding for education are important, but money is not a panacea.**

   There is a link between monetary inputs to education systems and success in the index. Our research suggests that governments could stand to devote more resources to cultivating teaching in particular, raising the salaries, profile and prestige of the profession. Though simply boosting budgets is not an all-encompassing solution, it can show to what extent education is a priority for policymakers with limited resources. Some lower-income economies, for example, spend a far higher share of their GDP on education than rich ones.

6. **A holistic and future-ready education system is inextricably linked with societal openness and tolerance.**

   The index results also rely on broader societal attitudes, including those toward cultural diversity, the treatment of women and freedom of information. Education systems cannot be expected to address next-generation global challenges if their socio-political backdrops are insular, repressive and hostile to new ideas. In general, economies with liberal economic and social traditions perform better in the index.

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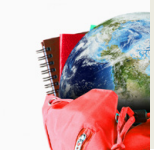

About the research

This paper is based on the findings of the first Worldwide Educating for the Future Index, created by The Economist Intelligence Unit (EIU) and commissioned by the Yidan Prize Foundation, along with in-depth interviews with 17 global experts. The index was developed to assess the effectiveness of education systems in preparing students for the demands of work and life in a rapidly changing landscape. It is the first comprehensive global index to evaluate inputs to education systems rather than outputs such as test scores, and concentrates on the 15-24 age band in 35 economies.

We would like to thank the following experts (listed alphabetically by surname) for contributing their time and insight:

- **Esteban Bullrich**, minister of education, Argentina
- **Lucy Crehan**, consultant, Educational Development Trust and author, *Cleverlands: The Secrets Behind the Success of the World's Education Superpowers*
- **Linda Darling-Hammond**, president, Learning Policy Institute, faculty director, Stanford Center for Opportunity Policy in Education and Charles E. Ducommun professor of education emeritus, Stanford University
- **David Deming**, professor, Harvard Kennedy School and Harvard Graduate School of Education and faculty research fellow, National Bureau of Economic Research
- **A C Grayling**, master, New College of the Humanities and fellow, St Anne's College, University of Oxford
- **David Hung**, associate dean, education research, and professor, learning sciences and education, National Institute of Education, Singapore
- **Nikki Kaye**, minister of education, New Zealand
- **Richard Levin**, senior advisor, Coursera (former chief executive officer) and former president, Yale University
- **Pasi Sahlberg**, chair, Global Education Advisory Board, Open Society Foundations
- **Andreas Schleicher**, director, Directorate for Education and Skills and special advisor on education policy to the secretary-general, OECD
- **Sir Anthony Seldon**, vice-chancellor, University of Buckingham
- **Qian Tang**, assistant director-general for education, UNESCO
- **Dankert Vedeler,** assistant director-general, department of policy analysis, lifelong learning and international affairs, Norwegian Ministry of Education and Research

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- **Tony Wagner**, expert-in-residence, Innovation Lab, Harvard University and senior research fellow, Learning Policy Institute

- **Catherine Whitaker**, chief executive officer, EtonX

- **Lord David Willetts**, executive chair, Resolution Foundation, former Universities and Science Minister, United Kingdom and author, *A University Education* (forthcoming)

- **Esther Wojcicki**, founder, Palo Alto High Media Arts Center; distinguished scholar, Media X, Stanford University; vice-chair, Creative Commons and author, *Moonshots In Education: Launching Blended Learning in the Classroom*

The index was shaped by an advisory board of four additional experts (listed alphabetically by surname):

- **Bob Adamson**, UNESCO chairholder, technical vocational education and training and lifelong learning; chair professor, curriculum reform; and director, Centre for Lifelong Learning Research and Development, The Education University of Hong Kong

- **Baela Raza Jamil**, director of programmes, Idara-e-Taleem-o-Aagahi; director, Institute for Professional Learning; coordinator, South Asia Forum for Education Development and managing trustee, Sanjan Nagar Public Education Trust

- **Simon Marginson**, professor, international higher education, UCL Institute of Education, University College London and director, Centre for Global Higher Education

- **Fernando M Reimers,** Ford Foundation professor of the practice in international education and director, Global Education Innovation Initiative and International Education Policy Program, Harvard University

This report was written by Nicholas Walton and was edited by Michael Gold. Trisha Suresh and Michael Frank designed the index and oversaw the data compilation. The EIU takes sole responsibility over the content of the index and the findings do not necessarily reflect the views of the Yidan Prize Foundation.

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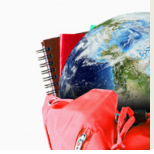

Introduction: on educating for the future, the world must try harder

Younger generations face a significantly different world in their future working and personal lives. This is being driven by globalisation, with greater integration between economies across the globe, and digital technology. Developments such as machine learning and automation promise further disruption, particularly in the workplace, and many established jobs are likely to vanish as a result. Other pressures such as migration, demographic change, urbanisation and environmental degradation will also increasingly affect peoples' lives. By 2045-2050, for example, global life expectancy at birth is projected to rise to 77 years, from 71 years in 2010-2015,[1] while the world's urban population is expected to comprise 66% of the total, up from 55% today.[2]

This preparation for the future will involve students acquiring a raft of specific skills that may help them deal with this changing world. Education will be less about learning information and more about analysing and using information. "Content knowledge is becoming a commodity," notes Tony Wagner of Harvard University. "The world no longer cares about what students know, but what they can do with what they know." To this end, we have identified the following types of skills current students will need to flourish in the world as adults:

- Interdisciplinary skills
- Creative and analytical skills
- Entrepreneurial skills
- Leadership skills
- Digital and technical skills
- Global awareness and civic education

The crucial question is whether the world's education systems are equipped to teach these skills. The index has been developed to help answer this question, and highlight where systems are getting it right and where they are failing. Indeed, there are a number of prominent disappointments. Taiwan, for example, despite a reputation for strong teaching in the science, technology, engineering and math (STEM) subjects, ranks only 19th, while Israel, the so-called "start-up nation", also underperforms, coming in at 26th.

Putting policy first

The first domain evaluated in the index is a given economy's policy environment—particularly the extent to which it prioritises skills for the future in education guidelines and action points. Only

1 *World Population Prospects: The 2017 Revision*, UN Department of Economic and Social Affairs Population Division (2017), https://esa.un.org/unpd/wpp/Publications/Files/WPP2017_KeyFindings.pdf

2 *World Urbanization Prospects: The 2014 Revision*, UN Department of Economic and Social Affairs Population Division (2015), https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Report.pdf, and data available at https://esa.un.org/unpd/wup/DataQuery/

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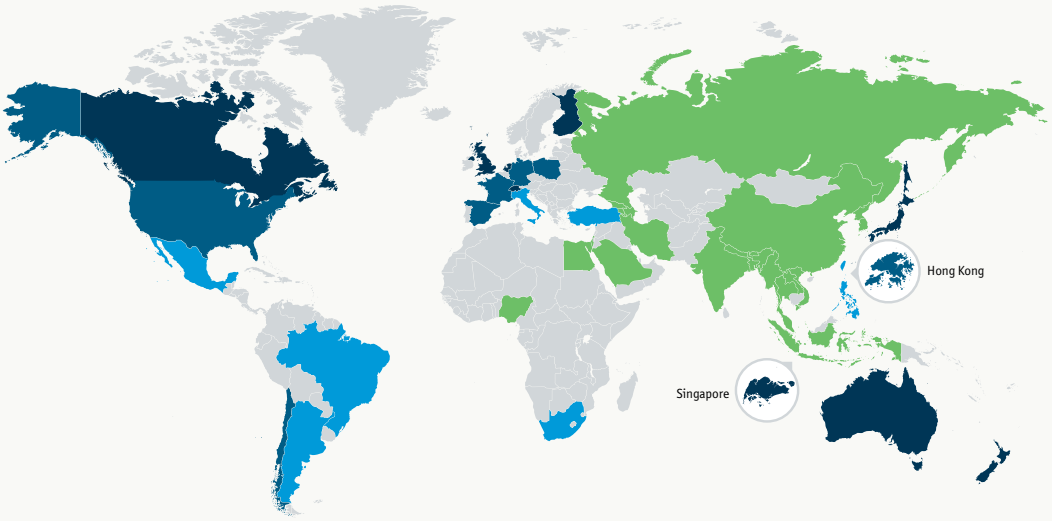
Worldwide Educating for the Future Index: overall results

(scores out of 100)



List of economies

Best environment		Good environment		Moderate environment		Needs improvement	
1. New Zealand	88.9	10. Germany	75.3	18. Italy	65.2	27. Russia	44.1
2. Canada	86.7	11. France	72.7	19. Taiwan	64.6	28. Vietnam	42.0
3. Finland	85.5	12. South Korea	71.7	20. Argentina	62.8	29. India	41.0
4. Switzerland	81.5	12. United States	71.7	21. Mexico	61.2	30. Saudi Arabia	37.3
5. Singapore	80.1	14. Hong Kong	68.5	22. Brazil	55.2	31. China	32.9
6. United Kingdom	79.5	15. Chile	67.5	23. South Africa	54.3	32. Nigeria	31.2
7. Japan	77.2	16. Spain	67.3	24. Turkey	51.0	33. Egypt	28.0
8. Australia	77.1	17. Poland	67.2	25. Philippines	50.2	34. Indonesia	27.9
9. Netherlands	76.2			26. Israel	46.7	35. Iran	23.5

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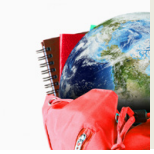

Canada, South Korea and the United Kingdom earn top marks in the comprehensiveness of a strategy targeting future skills. Of these places, only Canada also gets top marks for the existence of a curriculum framework to support this.

The index highlights a widespread need for holistic educational techniques such as project-based learning, where students grapple with a subject (often of their own choosing) in great depth and with reference to several academic disciplines. Lord David Willetts, a former UK Universities and Science Minister, says that this deep engagement helps students develop many important soft skills, compared to traditional learning methods. David Deming of Harvard University says that classrooms need to be "more project-based, interactive, with more peer-to-peer learning, group work and portfolio assessments". Some index economies—Argentina, Canada, Finland, France, Hong Kong, Mexico, New Zealand, Spain and Taiwan in particular—offer a robust focus on project-based learning, though of these nine, only Finland and France also provide strong assessment frameworks to test such learning.

The teaching imperative

Second, the index evaluates teaching environments. High quality teachers have the ability, flexibility and motivation to deal with the challenges of an effective future-skills education. The index assesses inputs such as the quality of teacher education and its relevance to future skills, the qualifications needed to enter the profession, and average teacher salaries, thereby suggesting concrete areas that policymakers can target.

The index's call to action is not just for teachers inside classrooms, however: preparing the young for these challenges needs involvement from business and industry. This helps the system recognise the demands and requirements of the labour market, as well as provide opportunities for students to learn how to apply their education in the real world. Andreas Schleicher of the OECD argues that classrooms need to be integrated with the outside world, and warns that "school is too isolated from the rest of our societies." the index shows that most economies are developing frameworks to counter this problem, although some, such as Egypt, Indonesia and Iran, are failing to do so.

> *School is too isolated from the rest of our societies.*
>
> ANDREAS SCHLEICHER, OECD

Social studies

Finally, the index evaluates a given economy's broader socio-economic backdrop. In part this is through economy-wide metrics such as gender diversity, cultural diversity and tolerance, and the extent to which there is a free press. This recognises the importance of a society's openness in equipping its young with an open, inquisitive and critical mind that is exposed to different attitudes and arguments. The increasing premium on creative and critical faculties and entrepreneurship implies that those who are encouraged to develop independent thought while being willing to take risks will flourish more than those from rigid or controlled societies.

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In part, this question also reflects how important it is for an education system to produce citizens able to contribute to wider society, for instance through their understanding of free speech, inequality, energy politics and environmental change. Educating students with attitudes that make them aware of and able to contribute to particular societies has long been an integral part of education systems; the index, through metrics such as the inclusion of global citizenship in curriculum guidelines and the capacity to assess them, throws the net wider, beyond national and regional boundaries. Unfortunately, half of the systems evaluated in the index fail the assessment aspect of this completely.

In highlighting these three broad domains, The index is aimed at making education systems more relevant and effective in a high-skills information age with more demanding labour markets. If they fail to adapt then they will fail millions of young people. Other studies already highlight alarming skill gaps: one OECD study found that almost a fifth of adults have poor reading skills; almost a quarter have poor numeracy skills; a quarter have limited computer experience and confidence; and just under half have only very basic computer proficiency.[3] Without these core skills, and the suite of softer skills demanded by information-age working environments, younger generations will fail to develop productive working lives, with severe implications for their wider economies. "Tertiary education and employment are increasingly globalised," explains Catherine Whitaker of EtonX, a UK-based company that provides soft-skills education to Chinese schools. "If you're coming from a system which doesn't develop these skills, you're in competition from systems that do." The index provides both a wake-up call for education systems, and pointers towards concrete steps that will help those systems cope with the challenges of a complex and very different future.

3 *Skills Matter: Further Results from the Survey of Adult Skills*, OECD (2016), http://www.oecd-ilibrary.org/docserver/download/8716011e.pdf

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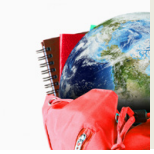

1 Getting the policies right: strategy, curriculum and assessment

Making education systems fit for purpose for future skills starts with governments, which have the most control over important variables such as overall strategy and curriculum design. However, as Linda Darling-Hammond of Stanford University points out, many governments have paid lip service to the need for better future-skills education without taking the necessary steps to make it happen: "There's a lot of hand-waving and rhetoric around these 21st century skills, but very few governments actually appreciate what that means for the nature of schooling and redesigning the systems we currently have."

> *There's a lot of hand-waving and rhetoric around these 21st century skills, but very few governments actually appreciate what that means for the nature of schooling and redesigning the systems we currently have.*
>
> LINDA DARLING-HAMMOND, STANFORD UNIVERSITY

A strategic approach to educating for future skills that resists short-term demands from politicians should include elements such as curriculum and assessment frameworks which specifically include future skills. Only Finland has perfect index scores for both, while the US is a surprising underperformer, lagging in areas such as presence of global citizenship in curriculum guidelines and relevance of textbooks toward future skills. Positive surprises in these categories include Russia, which earns full marks for the two aforementioned areas.

Assessment systems are particularly hard to reform. Mr Schleicher notes that high-stakes exams, particularly in East Asia, have helped drive high performance and provide clear signals of ability to employers and higher education systems. However, they only measure a far narrower range of traditional performance than in a future-skills framework involving project-based learning. Reforming such a system that is widely seen as delivering results is politically difficult, and would need to involve stakeholders such as employers and universities as well as parents and the students themselves. Mr Wagner argues that if assessment systems fail to reflect the future skills that employers demand they will lose credibility naturally. On this, France and Finland are ahead of the curve with top index marks for the project-based learning focus of their assessment frameworks; the Netherlands and South Korea could greatly improve their scores by paying more attention to this area.

The other key challenge for governments and policymakers is implementation. The index demonstrates a fair relationship between overall score and the effectiveness of implementing policy: high performers such as New Zealand, Canada, Finland and Switzerland all do notably well, while Italy's overall score is dragged down by an implementation score similar to the Philippines and Saudi Arabia.

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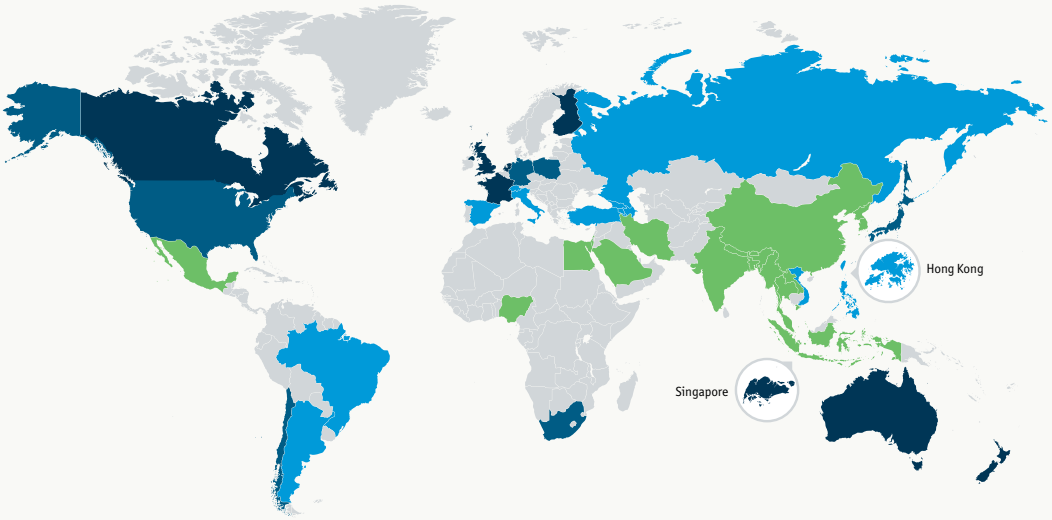
Worldwide Educating for the Future Index results: education policy environment

(scores out of 100)



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4. Finland	85.3	13. Poland	65.6	21. Spain	55.2	30. India	37.9
5. United Kingdom	78.3	14. Chile	65.5	22. Hong Kong	54.8	31. Philippines	33.6
6. South Korea	73.7	15. Germany	63.4	23. Italy	51.4	32. Indonesia	31.6
7. Taiwan	71.8	16. United States	63.3	24. Mexico	48.5	33. Egypt	29.6
8. France	70.2	17. South Africa	60.8	25. Vietnam	47.1	34. Nigeria	23.7
9. Australia	69.3			26. Turkey	44.3	35. Iran	18.9

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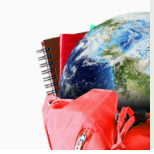

Constellation of skills

But what exactly are the skills that should be planned for, assessed and implemented? Begin with a strong grounding in foundational literacies, such as language and STEM subjects, argues David Hung of Singapore's National Institute of Education. With these foundations, he says, students have the ability to adapt to different contextual situations. However, students should avoid over-specialisation, as making connections between different concepts and issues, and having broader intellectual resources upon which to draw, will be valuable in less structured and regimented workplaces. "We want people who study history to have mathematical skills," says Lord Willetts, "and mathematicians and physicists who understand history, who've read novels, and who understand things like the ethical implications of their work." Students studying vocational education also need to learn this broader range of skills, as any technical skills needed for future employment are likely to evolve dramatically. If a school teaches how to code, for instance, the important thing the students learn is not the specific computer language, but the understanding of how to manipulate computer software. "The really crucial thing now is *how* to learn," says A C Grayling of Britain's New College of the Humanities.

The strategy should also emphasise less tangible creative and analytical skills, such as leadership and entrepreneurship. Ms Whitaker says that academic high achievers from places like East Asia, where such softer skills have been neglected in favour of "head-down studying", can struggle to cope in a Western university environment where they need to form their own opinions, participate in seminars and collaborate in multi-national project groups. Incorporating entrepreneurship into the curriculum, as in places like Finland and the Netherlands, is a useful way to cultivate these skills. Mr Wagner notes that "trial and error and iteration are the hallmarks of the innovation era", and are not easily taught through traditional methods. Mr Hung frets that Singapore's highly regarded education system may not produce the "talented innovators and mavericks" that flourish in knowledge economies, if the system is intolerant of non-traditional trajectories.

"Life-long learning", the acquisition of new skills throughout life, should also be a strategic aim, in part because specific technologies will evolve rapidly and mastery of them will prove fleeting. It is also because the quick overall pace of change will change the nature of the skills demanded by labour markets, favouring adaptability and flexibility. Education systems can help students negotiate this by developing broader character skills such as initiative and self-reliance. Sir Anthony Seldon of Buckingham University notes that this also improves exam results by encouraging responsibility, motivation and the ability to cope with stress.

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Educating for an ethical future

Future skills do not just encompass those meant to help students find gainful employment in future. They also include such areas as global citizenship and awareness of issues, from poverty to climate change, which transcend national boundaries. Here, economies such as Finland stand out: its guidelines specifically mention "internationalism" and global responsibility as mandatory thematic areas to be implemented in all schools,[4] while among middle-income economies, Mexico earns high marks, with a proposed curriculum which mentions skills related to the active participation of citizens and that recognises schools are the primary social space for formation of well-prepared citizens.[5]

Authorities such as Qian Tang of UNESCO, which has set the promotion of global citizenship education as a strategic goal, lament that these more abstract (and therefore harder to both teach and measure) areas of learning are not making their way into students' skillsets to an even higher degree. "When we talk about this theme of education and globalisation, we want to make sure people aren't solely focused on the intellectual or technical aspects," he says. "It's also just as much about the social and ethical dimension."

4 *Grunderna för gymnasiets läroplan 2015*, Finnish National Agency for Education (2015), http://www.oph.fi/download/174853_grunderna_for_gymnasiets_laroplan_2015.pdf

5 *Propuesta curriculuar para la educación obligatoria*, Mexico Secretariat of Public Education (2016), https://www.gob.mx/cms/uploads/docs/Propuesta-Curricular-baja.pdf

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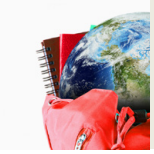

Box I. Zeal for learning

In the index, New Zealand comes out top of the class. Of all indicators, it only fared poorly for teacher salary, ranking 19th. It earned full marks for its curriculum framework for future skills, the effectiveness of its policy implementation system, teacher education, government education expenditure, career counselling in schools, collaboration between universities and industry, and cultural diversity and tolerance.

The reasons behind this success are twofold. First, New Zealand views educating for future skills as a broadly-agreed strategic imperative: it is a small and remote country, with the vigilance that comes with knowing it has little choice but to be globally competitive, now and in future. Second, it has a systematic government-led approach to making its education system fit for purpose, across technology, teaching, curriculum and collaboration with industry. "It's not just the teaching of the curriculum," says Nikki Kaye, New Zealand's education minister. "It's the investment in the teachers, investment in the infrastructure, and then the change in the business model to be more collaborative."

Digital natives

Installing digital infrastructure is one of the building blocks of New Zealand's future skills education system. Ms Kaye says that 98% of its schools are connected to fast and uncapped broadband connections that are paid for by the central government. But technology is viewed as an enabler for education, rather than an end in itself: "It's not just about hardware, but about the learning, and how you enable more personalised content that helps with engagement, collaboration and sharing best practice," she says. As part of this aim, she has led the formation of around 200 clusters of interconnected schools called "communities of learning".

> *There's this understanding that we're a trading nation. We naturally think a bit global, and that has impacted our thinking about technology and 21st century skills. We need to be adaptable, and thinking about opportunities outside New Zealand is ingrained in us.*
>
> NIKKI KAYE, MINISTER OF EDUCATION, NEW ZEALAND

This connectivity has led to a greater emphasis on technological skills in a revamped school curriculum. "The first strand is digital use and design," explains Ms Kaye. "Students are able to go online, navigate, access content and apply critical thinking. The other strand is called computational thinking, with foundations in computer science. It also looks at the impact of

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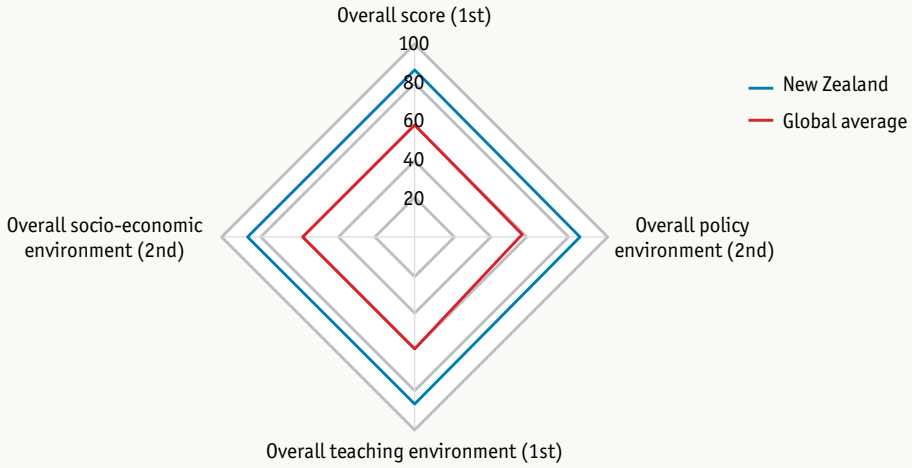
Teaching the Kiwis

New Zealand, index scores (out of 100)



technology on society, and equips young people with the ability to think so they can be creative with technology rather than just users." The curriculum is also flexible, so that youth are taught skills that are relevant to the local as well as national economic context.

Curriculum development is accompanied by investment in training teachers in "digital fluency and computational thinking", and digital scholarships that teachers can use to access further training. Classroom learning has also been digitised, including online assessments, and the Education Ministry is exploring how to track students' personal performance during sensitive times such as moving to new schools. "We recognise that technology can enable more personalised learning and more seamless educational pathways. That's why we're hungry for it," says Ms Kaye.

End-of-the-world advantages

New Zealand's education reforms have been underpinned by awareness of its vulnerability thanks to its small size and remoteness. As forces such as automation, environmental change and evolving patterns of consumption change the global outlook, smaller economies have to be even more alert to emerging trends and opportunities, with the flexibility and resourcefulness to take advantage of them.

In New Zealand, this recognition has led to a broad strategic consensus about educating for future skills from across the political divide. "There's this understanding that we're a trading nation," says Ms Kaye. "We naturally think a bit global, and that has impacted our thinking about technology and 21st century skills. We need to be adaptable, and thinking about opportunities outside New Zealand is ingrained in us."

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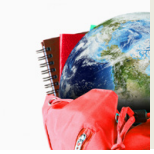

2 Teachers: the ultimate resource

Effective teachers are even more central to a successful future-skills education system than in more traditional schooling environments. Mr Hung calls teachers "one of the highest leverage points a good system has", being able to teach difficult concepts to students of different abilities, enthuse them and link those concepts to the world beyond the classroom. The index recognises this by accounting for several teacher-centric system inputs, such as training and the qualifications needed to enter the profession. These indicators give clear messages to policymakers about where they can make significant improvements. For instance, the US scores only as well as Vietnam, China, Egypt and Iran for the qualifications needed to enter the teaching profession, suggesting a clear path to improvement which may revolve around making these qualifications more stringent.

Money matters

The index highlights a less clear correlation between overall performance and teachers' salaries. Germany and Japan score by far the highest for teacher pay (with Turkey, Hong Kong and Korea also notably high), far outstripping their overall placings of sixth and tenth. New Zealand and Canada rank first and second on the index despite having only the 19th and 17th highest teacher salaries, respectively. Pasi Sahlberg of Open Society Foundations says that raising the professional and societal status of teachers, as they have done in Finland, is a better path to more effective teaching than simply raising salaries. This is echoed by Mr Hung, who says that status is vital for attracting the most able students into the teaching profession, and motivating them: "The culture of Singapore has moved to a place where the profession of teaching is more highly valued by families and parents. Two decades ago this wasn't the case. Pay is important. The substantive quality of teachers as observed by the public is important."

The culture of Singapore has moved to a place where the profession of teaching is more highly valued by families and parents. Two decades ago this wasn't the case. Pay is important. The substantive quality of teachers as observed by the public is important.

DAVID HUNG, NATIONAL INSTITUTE OF EDUCATION, SINGAPORE

Beyond simply looking at teachers' salaries, the index includes broader government expenditure on secondary education as well. Mr Sahlberg argues that "the resources, the funding, the money that is invested in a system" is directly related to what you get out. The share of its resources a country spends on education can help observers understand to what extent education is prioritised and seen as a valuable investment. Here, many lower-income economies are standout performers. Brazil, Turkey and Vietnam, for example, all rank in the top ten.

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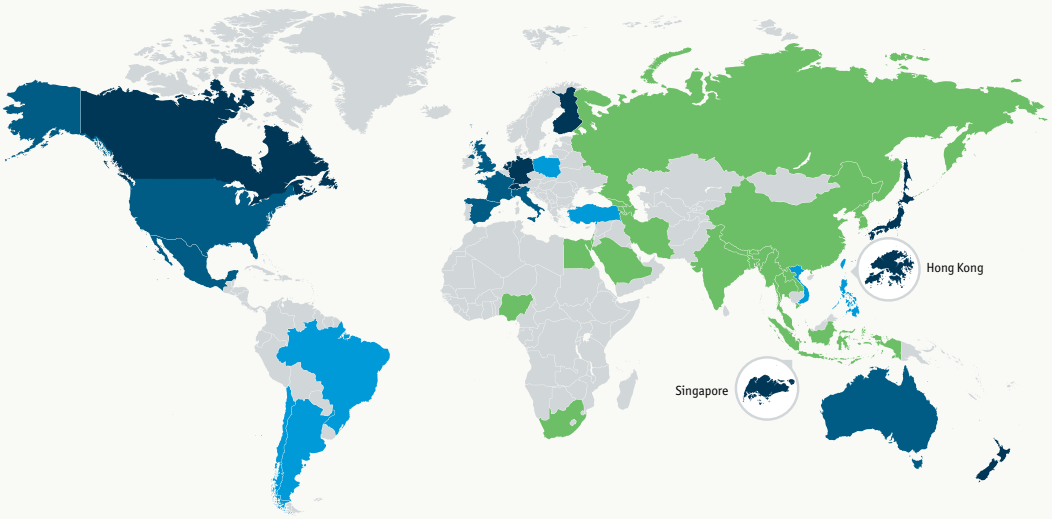
Worldwide Educating for the Future Index results: teaching environment

(scores out of 100)



List of economies

Best environment		Good environment		Moderate environment		Needs improvement	
1. New Zealand	88.4	10. Australia	78.0	18. Poland	67.3	27. India	44.6
2. Canada	87.1	11. Netherlands	77.2	19. Chile	66.5	28. South Africa	44.2
2. Switzerland	87.1	12. France	77.0	20. Turkey	63.4	29. Saudi Arabia	42.3
4. Japan	86.9	13. United Kingdom	76.9	21. Argentina	62.1	30. Nigeria	37.4
5. South Korea	82.0	14. United States	76.1	22. Philippines	59.7	31. Russia	36.5
6. Hong Kong	80.7	15. Italy	72.8	23. Taiwan	57.4	32. Iran	29.1
7. Finland	80.0	16. Mexico	70.1	24. Israel	51.4	33. Egypt	28.4
8. Singapore	78.7	17. Spain	69.5	25. Brazil	47.8	34. China	26.2
9. Germany	78.5			26. Vietnam	46.1	35. Indonesia	22.4

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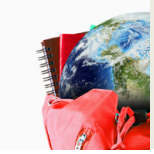

Still, poorer economies that spend a higher share of GDP on education are still likely spending less in absolute terms (especially per pupil) than richer, smaller ones, even those near the bottom. Though experts caution that money alone is not a cure-all, some rich economies like Switzerland and Canada may want to rethink their national priorities and put more resources in this area.

A thankless profession?

The quality of teacher education is widely recognised as a vital component of all education systems. Mr Sahlberg says that Finland's strong showing in both traditional educational rankings and the index are founded on radical improvements in teacher preparation begun 40 years ago. This contributed to a rise in teaching quality and professional status. According to Mr Sahlberg, now only one in ten applicants to teacher training is successful. Finland, along with Canada, Chile, New Zealand, Singapore and Switzerland, earns full marks in the index for teacher training. These six, plus Poland, also score full marks for the relevance of that training to future skills. China and Indonesia, on the other hand, rank in the bottom group on both indicators.

Effective teachers allow an education system to pursue competency-based learning, which ensures that students of all abilities understand a concept, for instance in mathematics, before progressing to the next level. This is complex and demanding, as teachers must be able to respond to differing needs, for instance helping less-able students while making sure the most able are still stimulated. However, competency-based learning is vital for future-skills education as it gives students of all abilities an understanding of core literacies such as maths, science and language. They can then use them as the foundation for further learning, for instance in project-based work or the creative use of technology.

Excellent teachers also provide the most important bridge between the classroom and the outside world. This is crucial in learning how to apply skills and knowledge in non-academic settings. In Singapore, schools have developed programmes outside formal classrooms where students can choose activities such as coding or robotics. The guiding idea behind them is to allow students to make connections between concepts learned in the classroom and practical real-world applications of those concepts, facilitated and encouraged by teachers.

Collaboration nations

Initiatives beyond the classroom are also assisted by collaboration with businesses, wider society and other schools and universities. Canada and Japan both score highly for this on the index, followed by Finland, New Zealand, Switzerland, South Korea and the United States. Among poorer economies, the Philippines ranks very highly for its links between universities and industry, while South Africa, Taiwan and Chile need to do more to create opportunities in this regard. The UK, Germany and Singapore could also all improve further in this area.

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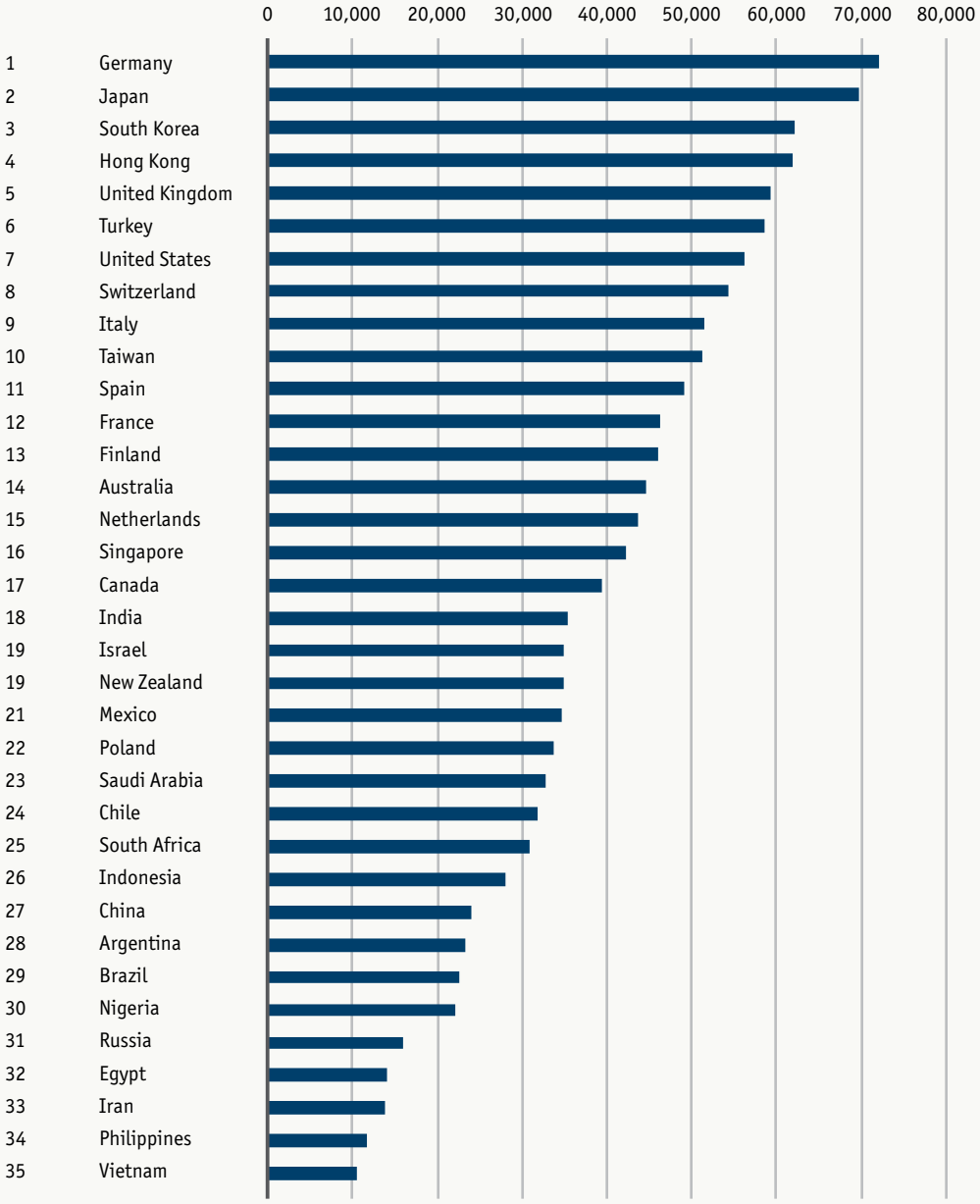
To teach or not to teach

Average high school teacher salary, all indexed economies
(US$ by purchasing power parity, 2017)



Source: The Economist Intelligence Unit

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Box II. Argentina: starting on the path to reform

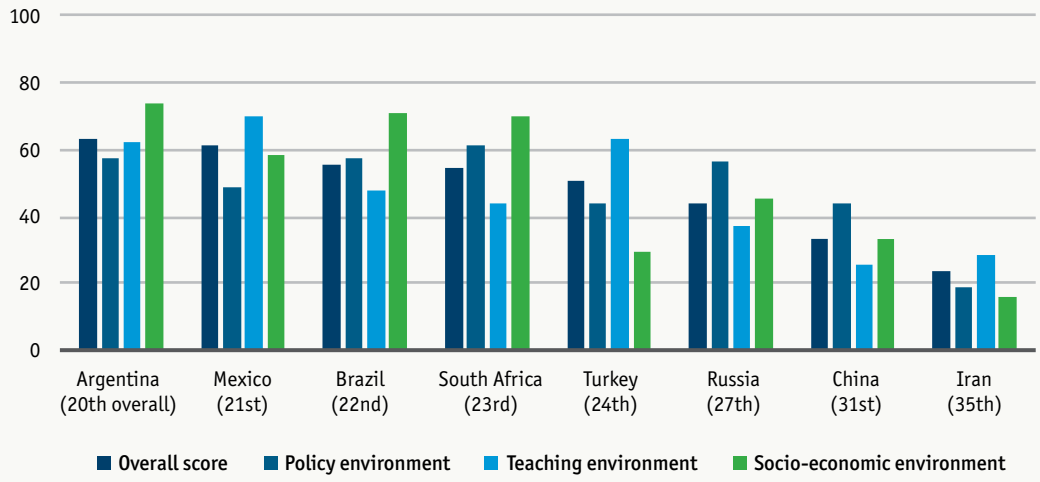
Reforming an education system to prioritise the learning of future skills is not just the preserve of richer economies with established knowledge-based sectors. The global trends that will disrupt work and life in future decades, such as automation and robotics, will also affect middle-income and developing economies. "As you go to a more knowledge-based economy, people have to think on their own much more," says Mr Schleicher.

This is an insight that is informing Argentina's attempts to overhaul its own education sector. "We are turning into a more service- and technology-orientated economy," says Esteban Bullrich, the country's education minister. "We are seeing a shift in the skills requested by businessmen. We're going into a world where people will be changing jobs, areas of interest, fields of expertise many, many more times than our parents did."

Argentina's index performance is the highest for a middle-income economy.[6] It ranks 20th, beaten in Latin America only by Chile. It is showing real signs of progress in areas such as quality of teacher education and qualifications, education expenditure, and curriculum and assessment frameworks supporting skills for the future. Elsewhere it performs poorly, for instance ranking second-to-last for the comprehensiveness of its national education strategy on skills for the future. Mr Bullrich's reforms may change this.

Like New Zealand, Argentina has invested heavily in technology infrastructure. Mr Bullrich says the government's aim is to

Middle income, middling education?
Middle-income economies, index scores (out of 100)



6 Defined as gross national income per capita of $4,036 to $12,475 (see https://blogs.worldbank.org/opendata/new-country-classifications-2016)

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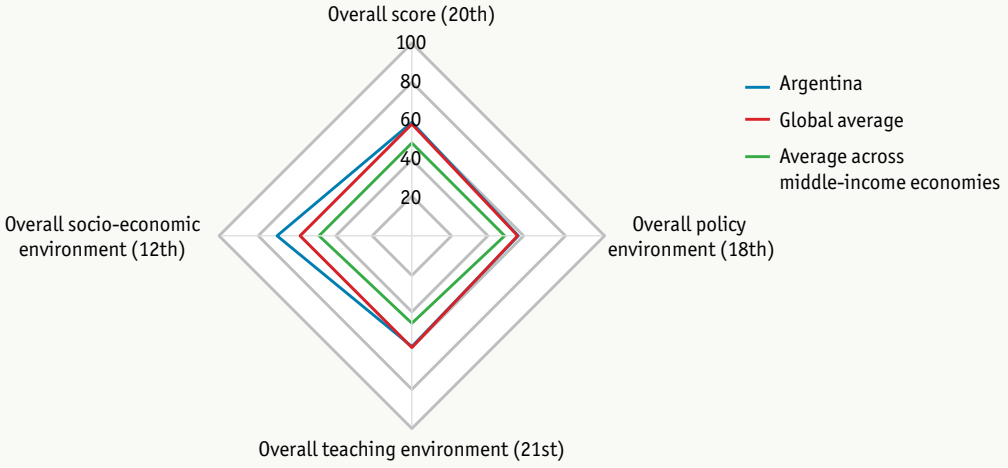
Dancing the reform tango

Argentina, index scores (out of 100)



connect all schools to the internet by the end of 2018. "Technology is a factor because kids are going to use it no matter which field of knowledge they'll go into," he explains. "Even arts are more and more technology-dependent."

The education system is like an old car that you keep on upgrading… we've left that old car behind and jumped into a spaceship that we're building from scratch.

ESTEBAN BULLRICH, MINISTER OF EDUCATION, ARGENTINA

Overhauling the quality of teaching is a bigger challenge for Mr Bullrich. He says that the leaders of Argentina's powerful teaching unions distrust government promises, and are prone to calling strikes. However, he says that the teachers themselves are open to more constructive solutions. New measures include doubling their minimum wage, introducing scholarships to attract the brightest students into the profession, and encouraging teachers to contact him directly with questions and concerns.

Argentina is also keen to learn from examples abroad. Headmasters visit innovative schools in places such as Finland and Sweden, and are then encouraged to share their experiences and insights. It has also begun to shift to more project-based learning involving collaboration and problem-solving. Although Mr Bullrich's overhaul is partly constrained by Argentina's economic problems, he is demonstrating the impact of a strong strategic vision aimed at equipping a country's young people for future challenges. "The education system is like an old car that you keep on upgrading," he says. "But we've left that old car behind and jumped into a spaceship that we're building from scratch."

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Box III. Technology: a classroom revolution

The most robust prediction about how the 21st century will unfold is that life and work will be increasingly disrupted by digital technologies. "Unlike earlier industrial transformations that hit one industry at a time, digitisation is affecting every type of industry and job," notes Richard Levin of ed-tech firm Coursera. As a result, access to the internet, digital literacy and skills such as basic coding and online security are vital for a future-skills education. Technology also has the power to transform the classroom in myriad other ways.

Despite technology's importance and potential, an education system that simply delegates teaching to digital devices is unlikely to succeed.[7] Instead, technology's main classroom role is to complement and enable good learning practices. This includes personalised learning, where students work at a pace appropriate for their abilities, and often on subjects or projects that they have chosen themselves. "Kids learn more when they're doing things that they personally care about, and this allows students to pick things that matter to them," argues Esther Wojcicki of Palo Alto High School. Individual digital devices allow this flexibility of choice and pace, while algorithms can track performance and allow teachers to identify and address individual students' needs.

Some technologies facilitate collaboration between students and between schools. Ms Whitaker says the opportunities to do this are only just being explored: "It's still early days in terms of seeing new ways of learning and bringing students together from across the globe in real time." As well as learning how to work effectively in teams, this will expose students to a wider variety of backgrounds and perspectives.

For teachers, internet-enabled collaboration will give them more opportunities to learn best practice from each other. This will assist with more advanced and complex teaching tasks. Mr Deming argues that it will also help them better teach future skills by assisting with more routine teaching tasks: "Technology will help with the boring nitty-gritty stuff like timetables, allowing them to concentrate on knowledge transfer and connecting people. The real promise of technology is to free teachers from mind-numbing drilling."

Rise of the MOOCs

Mr Levin says that credentials from next-generation sources such as Massive Open Online Courses (MOOCs) that his company Coursera provides, will disrupt assessment systems and make them more responsive to the skills demanded by employers. Such disruption is likely to open up pathways toward the kind of lifelong learning that is a core feature of most future-skills education systems. Mr Levin says this will make

7 One OECD study found no discernible link between levels of spending on classroom technology and basic learning outcomes. See *Students, Computers and Learning: Making the Connection*, OECD (2016), http://www.oecd.org/publications/students-computers-and-learning-9789264239555-en.htm

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institutions less formal: "The focus will no longer just be to educate people in the early stages of their adult lives, but throughout their lifetimes."

> *The focus will no longer just be to educate people in the early stages of their adult lives, but throughout their lifetimes.*
>
> RICHARD LEVIN, COURSERA

Technology will disrupt education and assist the learning of future skills in other ways, for instance through allowing greater analysis of teaching data and trends, and how this relates to the evolving demands of the labour market. Its disruptive power will be best harnessed by education systems that are able to foster innovation and find ways to systematise those that work, even at the expense of incumbents and institutions. Its power will not be best harnessed by systems that merely bombard students with expensive devices.

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Money can't buy the future

Government expenditure on post-secondary education, all indexed economies (% of GDP)

Source: UNESCO

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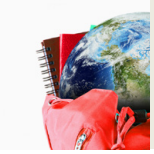

3 Open societies will be better prepared for a rapidly changing future

The index recognises a strong correlation between a generally open society and preparing its younger generations for the challenges of a changing future. Among the index's highest scorers, New Zealand, Canada, Finland and Switzerland all score highly on indicators related to a free and fair society. Among lower performers, Turkey, Russia, China and Vietnam would all improve their scores with more freedom and openness. Specific indicators such as corruption are strongly correlated with overall performance among higher performing economies, as is press freedom (other than in the specific case of Singapore, which is ranked 29th on this indicator compared to 5th overall).

The extent to which these societal factors influence the acquisition of future skills is heretofore uncharted territory. Without a doubt, an open society is important in a future-skills education because it reflects and supports some of the more intangible character attributes necessary for work and life in a rapidly changing future. An open society encourages responsibility, self-reliance and the ability to make robust choices while recognising trends and opportunities. It also generates variety and exposes students to different points of view.

Both Japan and South Korea would score higher on the index by paying more attention to some of the indicators in this section: Korea ranks 12th overall with a strong showing on future-education policy (6th) and teaching environment (5th), but ranks only 26th on socio-economic environment; Japan is 7th overall, coming in 4th place for teaching environment and 12th for policy, but a comparatively lowly 20th for socio-economic environment. Notably, both underperform on gender equality (something that they share with Turkey, Saudi Arabia and Iran). South Korea is also a notable under-performer on environmental performance (along with India).

Education is for the whole person because every individual is not just a career but a voter, a neighbour, a parent. It is of the first importance that everybody, including our physicists and accountants, should have had the opportunity to think about and discuss the world.

A C GRAYLING, NEW COLLEGE OF THE HUMANITIES

Both Mr Sahlberg and Dankert Vedeler of the Norwegian Ministry of Education and Research emphasise that equity is a vital component of a future-skills education system: it involves holding students of all abilities up to a high performance standard, encouraging competence-based learning and realising the maximum potential of all, to the benefit of the wider economy. Mr Sahlberg notes that "a critical

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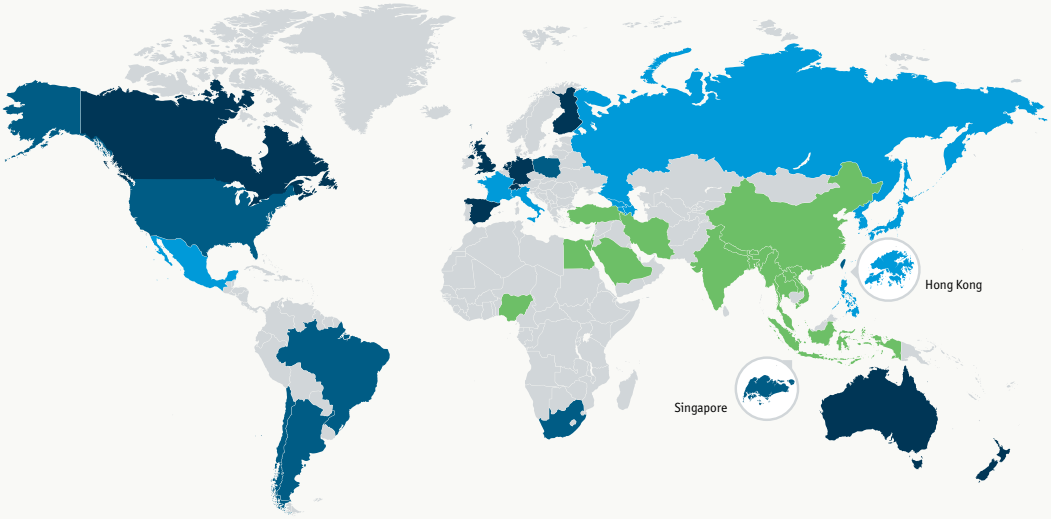
Worldwide Educating for the Future Index results: socio-economic environment

(scores out of 100)



List of economies

Best environment		Good environment		Moderate environment		Needs improvement	
1. Finland	99.5	10. United States	73.2	18. Italy	66.9	27. India	36.5
2. New Zealand	92.2	11. Chile	72.9	19. France	65.8	28. Indonesia	36.3
3. United Kingdom	88.1	12. Argentina	72.6	20. Japan	65.7	29. China	33.5
4. Australia	86.5	13. Taiwan	71.5	21. Hong Kong	58.4	30. Turkey	30.0
5. Switzerland	86.2	14. Brazil	71.3	22. Mexico	58.0	31. Nigeria	27.0
6. Germany	85.3	15. Singapore	70.4	23. Philippines	51.7	32. Egypt	24.3
7. Canada	85.2	16. South Africa	70.1	24. Israel	45.5	33. Vietnam	24.0
8. Netherlands	84.3	17. Poland	69.4	25. Russia	44.8	34. Iran	16.3
9. Spain	79.8			26. South Korea	42.8	35. Saudi Arabia	15.8

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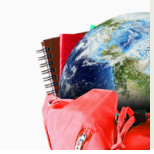

negative consequence of unequal education" is that it reduces security and social cohesion.

Looking at the phenomenon from the other direction, Mr Grayling stresses the importance of education in contributing to the resilience and success of broader society. As automation and digital technologies may result in less work for humans in the future, people may need to prepare for an uncertain and dislocated working life that may involve more free time, whether welcome or involuntary. Mr Grayling argues that students should not merely be trained in technical skills, but equipped with an education that prepares them for such insecurity. He champions a more Aristotelian approach to education that also helps students make productive use of their leisure rather than purely chase a career. "Education is for the whole person because every individual is not just a career but a voter, a neighbour, a parent. It is of the first importance that everybody, including our physicists and accountants, should have had the opportunity to think about and discuss the world," he says.

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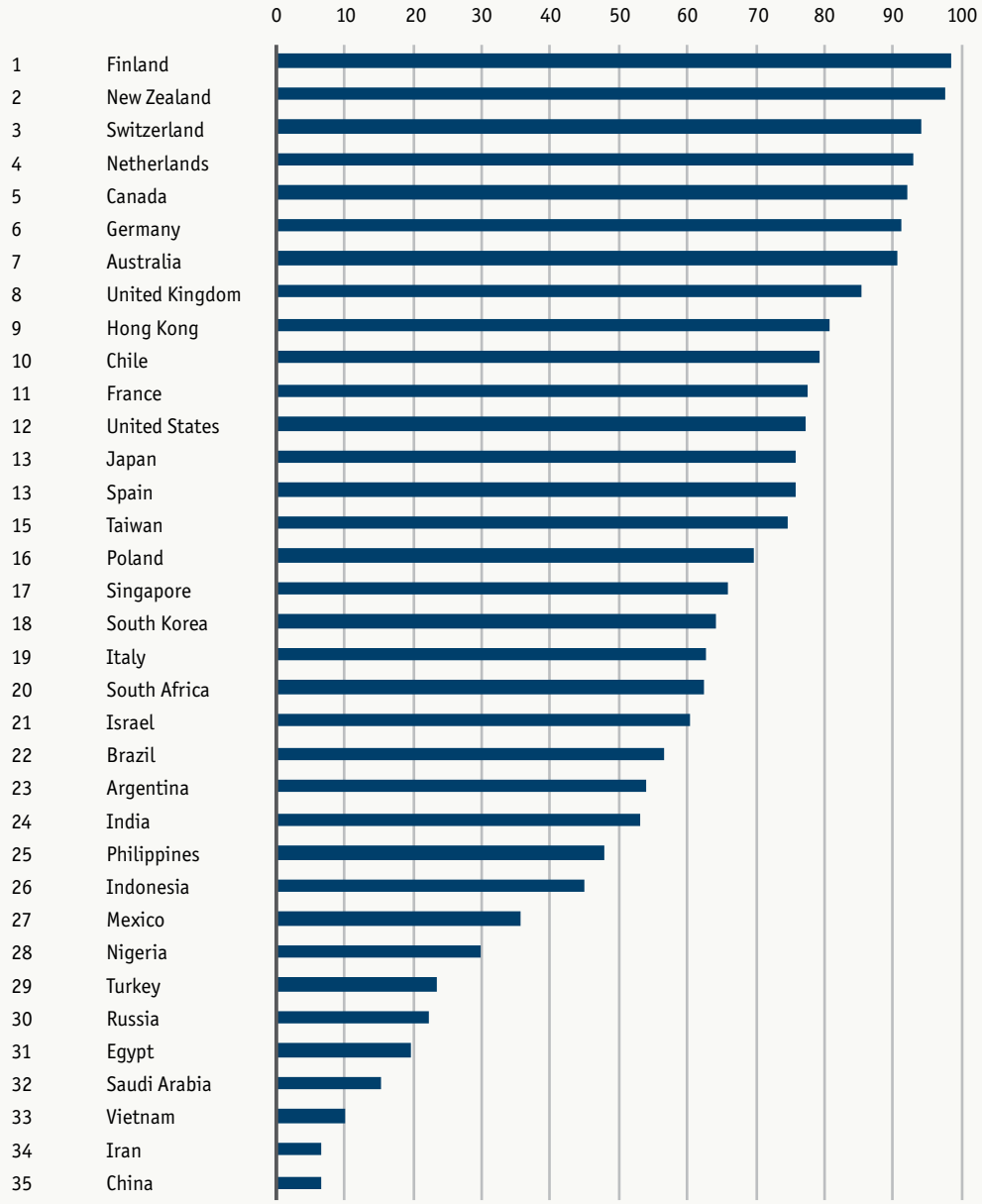
The free and the not-so-free

Free and open society*, all indexed economies (score out of 100)



*Defined as the weighted, standardised sum of the World Press Freedom Index (Reporters Without Borders, 2017), Corruption Perceptions Index (Transparency International, 2016) and Democracy Index (The Economist Intelligence Unit, 2016)

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Box IV. A comparison between the index and PISA: inputs versus outputs

The field of educational performance rankings was already a crowded one before the introduction of the index. However, this index is different from others in two important ways. First, it looks at how students within each system are being prepared for the challenges of work and life in the future, rather than traditional educational achievements. Second, as this is less tangible than acquired knowledge or defined problem-solving skills, it tries to capture performance by assessing inputs as opposed to outputs such as test scores.

In order to gauge this relationship between inputs and outputs, we evaluated the index against the Programme for International Student Assessment (PISA), a comprehensive skills-based exam administered by the OECD. Among economies which were included in both the index and PISA, we found there is a relationship between overall scores in the index and the four domains of PISA, but it is not particularly strong.[8] Some systems perform well in both, such as New Zealand, Finland, Canada and Singapore. Vietnam and Hong Kong do well in PISA but less so in the index, while the opposite is true of Chile and France. One might expect economies that perform well in this year's index to do well in the next iteration of PISA.

In some ways, the two indexes are complementary: as noted above, competence in the fundamental literacies that PISA measures is one of the foundations of a future-skills education system. The PISA methodology captures achievement through problem-solving tests to produce a measurable output. The index deals instead with inputs that relate to these competences, such as the quality of teacher training and the qualifications demanded of entrants into the teaching profession. This metric affects a system's ability to deliver robust education in STEM or other core subjects. Crucially, it also reflects the importance of effective teaching to a broader and more holistic set of education outcomes, including future skills such as collaboration and critical thinking. Other indicators, such as inter-school or university-industry collaboration, and strategic frameworks aimed at future skills, reinforce the relevance of the the index's assessments.

Testing times

Evaluating inputs rather than outputs also avoids some problems associated with tests and exams. As noted above, reforming assessment regimes to reflect the different skills that students will require in the future is difficult. This is partly because such skills are harder to measure, and partly because exams and assessments are resistant to change, thanks to their accreditation by stakeholders such as higher education institutions,

8 PISA does not present a single aggregate ranking per education system, but instead produces separate rankings for mathematics, science and reading, along with performance in collaborative problem solving. See *PISA 2015 Results (Volume I): Excellence and Equity in Education*, OECD (2016), http://www.oecd.org/publications/pisa-2015-results-volume-i-9789264266490-en.htm

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employers and parents. However, Sir Anthony warns that the hard-headed focus on exams is at least partly to blame for education systems being "hopelessly ill-fitting" when it comes to modern skills. He argues that exam results in traditional subjects (and news headlines related to PISA results) have become misguided short-term metrics for government performance. Other, less tangible but more relevant skills are then neglected as they distract from the "short-term KPIs" of exams. "[PISA and the OECD] have already done so much damage because schools concentrated just on the passing of exams without the development of the complementary skills that young people need to lead a flourishing life and be successfully employed," he says.

[PISA and the OECD] have already done so much damage because schools concentrated just on the passing of exams without the development of the complementary skills that young people need to lead a flourishing life and be successfully employed.

SIR ANTHONY SELDON, UNIVERSITY OF BUCKINGHAM

Singapore tends to perform very strong in the PISA rankings, and traditional exams play an important and motivational role in school life. However, Mr Hung is concerned that an over emphasis on high-stakes examinations (and national success in international benchmarking tests) may threaten to dominate the functioning of Singapore's education system, and he hopes that the system will introduce other performance metrics reflecting less quantifiably measured skills.

For its part, the OECD is modifying PISA to recognise a broader set of competences. "In the last PISA round [in 2015], for the first time we assessed collaborative problem-solving skills," explains Mr Schleicher, under whose remit PISA falls. "We're working on an assessment of global competences, and have devoted quite a bit of attention to assessing social and emotional skills."

Others believe PISA has already proved its worth in improving education standards across the world. Author and education consultant Lucy Crehan says PISA results encouraged Finnish reformers when they were overhauling their system, despite some political opposition, and credits the study with effectively measuring "children's ability to use the knowledge they have in three core areas". The index has a different scope, but what it is trying to measure is just as integral to what an education system is and what it must achieve.

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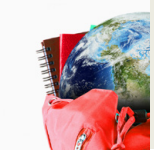

Conclusion: educating for the innovation era

If the standard educational model of today was created for the industrial age, nothing less than a new educational model is needed to prepare the world's students for the demands and challenges of the information and innovation age. Rapidly evolving technologies, including digitisation, automation and machine learning, are going to disrupt the workplace in untold and dramatic ways. Whole employment sectors are likely to disappear, with others hopefully created. Students, workers and entire economies will compete across global borders for the best education, jobs and growth; all three will need to be nimble, flexible and dynamic, ready to recognise and respond to emerging trends swiftly. Other challenges will include environmental change, urbanisation, migration and demographic shifts.

The world's education systems are currently not doing a very good job of preparing our young for such a future. Some are getting many things right, including a strategic appreciation of what skills they will need: problem solving, critical-thinking, collaboration, creativity, initiative, communication, drive and curiosity, all founded on a core of key competences in reading and STEM subjects. Some governments are making real progress in areas such as curriculum and assessment frameworks that support the learning of these skills, along with the crucial input of highly-skilled, well-trained and motivated teachers. In the best cases, they are introducing teaching methods such as project-based and civic education, and encouraging collaboration with other students and industry. Concepts introduced inside the classroom are being applied to the world outside. Digital skills that allow students to use technology creatively and critically are also being developed. The best schools draw on the resources of open and free societies that encourage debate and harness innovations.

Most, however, have much to do to meet these challenges. In some cases, extra work in key areas will pay large dividends; in others, large-scale overhauls of failing education systems are needed. At stake are the future lives of many millions of young people, and the competitiveness of entire economies. The index has been designed to reflect these relative performances, and to provide both a guide and a call to arms for policymakers. It recognises the key inputs into an education system rather than exam-like outputs, and emphasises the differences between industrial-era education systems and those needed to meet the challenges of the future.

"Governments need to wake up," says Sir Anthony. There are signs that some are recognising the challenges ahead. In China, notes Ms Whitaker, there is a sense that the strong tradition of highly competitive exam-based education is no longer suitable. "When a system like China's wakes up to something," she says, "you know it's a trend." But Mr Tang believes that more urgency is needed: "I don't see this kind of thing in more formal official national development strategies. It's good for the media to emphasise this and get policymakers to act faster."

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Some, such as New Zealand, are already acting fast. Argentina is showing that a cash-strapped middle-income economy can recognise the challenge, develop a suitable strategy and find practical ways to implement change. Others still lag far behind. There are few more important tasks for governments than to understand the challenges their youth will face in ten, 20 or even 50 years' time, and to work hard to prepare them for it.

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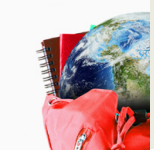

Appendix: index methodology

The Worldwide Educating for the Future Index is a benchmarking exercise that objectively compares the commitment of governments to develop and promote education that equips youth with skills for the economic and social demands of tomorrow. The index covers 35 economies in the developed and developing world. It scores economies across three categories: policy environment, teaching environment and socio-economic environment. The indicators fall into two broad categories:

- Quantitative indicators: eight of the index's 16 indicators are based on quantitative data—for example, government expenditure on post-secondary education as a percentage of GDP.

- Qualitative indicators: eight of the index's 16 indicators are qualitative assessments of an economy's environment for educating youth with skills for the future—for example, career counselling in high schools, which is assessed on a scale of 0-2, where:

  - 2=career counselling services are available in high schools

  - 1=career counselling services are somewhat available in high schools

  - 0=career counselling services are not available in high schools

To focus the analysis, this index assesses education for youth aged 15-24. The 35 economies selected represent 88% of global GDP and 77% of global population. We selected them based on income levels and population size, with upper and lower bounds on these metrics for geographic diversity.

Data sources

Our research team collected data for the index in April-June 2016. Wherever possible, publicly available data from official sources are used for the latest available year. The qualitative indicator scores are derived from publicly available information (such as government policies and reviews) and expert interviews. Qualitative indicators are presented on integer scales.

Indicator scores are normalised and then aggregated across categories to enable an overall comparison. To make data comparable, we normalised the data on the basis of:

$$Normalised\ x = (x - Min(x)) / (Max(x) - Min(x))$$

where Min(x) and Max(x) are, respectively, the lowest and highest values among the 35 economies for any given indicator. The normalised value is then transformed into a positive number on a scale of 0-100. The same process applies to quantitative indicators, where a high value indicates a better environment that supports educating for the future. All raw data for the index is available to download from educatingforthefuture.economist.com.

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Categories and weights

Our research team assigned category and indicator weights after consultations with internal analysts and external education experts. We assessed 16 indicators across three thematic categories: policy environment, teaching environment and socio-economic environment.

We allocated 30% of the index weight to the **policy environment** category. The indicators in this category assess the extent to which government policy explicitly calls for educating for the future. Education strategy, curriculum, assessment and implementation are considered in this category.

The largest category, **teaching environment**, accounts for half of the index. Within this category, quality of teacher education makes up the largest share, accounting for 20% of the category. Other indicators similarly assess the quality of teaching, support for teachers and extra-curricular student support programmes.

The final category, **socio-economic environment**, measures the extent to which societies are prepared to educate youth for the skills of tomorrow. Indicators in this category assess diversity, tolerance, openness, equality and civic mindedness at the societal level.

The following table provides a brief description of indicators, data and weights:

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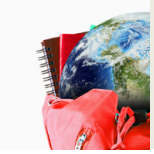

INDICATOR	RATING	WEIGHT
1) POLICY ENVIRONMENT		**30%**
1.1) Comprehensiveness of education strategy on skills for the future		35%
1.1.1) Existence of strategy	Rating 0-3	
1.1.2) Milestones and action plan	Rating 0-2	
1.1.3) Monitoring and evaluation metrics	Rating 0-2	
1.2) Existence of curriculum frameworks to support educating for skills for the future		20%
1.2.1) Presence of skills for the future in curriculum guidelines	Rating 0-2	
1.2.2) Presence of creating global citizens in curriculum guidelines	Rating 0-2	
1.2.3) Presence of project-based learning in curriculum guidelines	Rating 0-2	
1.2.4) Focus on career guidance and counselling	Rating 0-2	
1.2.5) Relevance of textbooks for skills for the future	Rating 0-2	
1.3) Existence of assessment frameworks to support educating for skills for the future		20%
1.3.1) Assessment frameworks to test skills for the future	Rating 0-2	
1.3.2) Assessment frameworks to test global citizenship skills	Rating 0-2	
1.3.3) Assessment frameworks for project-based learning	Rating 0-2	
1.4) Effectiveness of system in policy implementations	Rating 0-5	25%
2) TEACHING ENVIRONMENT		**50%**
2.1) Quality of teacher education		20%
2.1.1) Consistency of teacher qualifications	Rating 0-2	
2.1.2) Relevance of teacher education to skills for the future	Rating 0-2	
2.2) Teacher qualifications (secondary and post-secondary level teaching)	Rating 0-5	15%
2.3) Average teacher salary (high school)	US$ PPP	10%
2.4) Government expenditure on education (post-secondary)	% of GDP	10%
2.5) Availability of career counselling for youth in schools		15%
2.5.1) Career counselling services in high schools	Rating 0-2	
2.5.2) Career counselling services in universities	Rating 0-2	
2.5.3) Presence of subjects for career marketability	Rating 0-2	
2.6) Availability of opportunities for students to collaborate beyond classrooms		15%
2.6.1) Availability and support for study abroad at high school level	Rating 0-2	
2.6.2) Collaboration across schools at high school level	Rating 0-2	
2.6.3) Availability and support for study abroad at university level	Rating 0-2	
2.7) University-industry collaboration	Rating 0-2	15%
3) SOCIO-ECONOMIC ENVIRONMENT		**20%**
3.1) Cultural diversity and tolerance	Score 0-6	31.6%
3.2) Free and open society		31.6%
3.2.1) World Press Freedom Index	Score	
3.2.2) Corruption Perceptions Index	Score	
3.2.3) Democracy Index	Score	
3.3) Gender diversity	Score	15.8%
3.4) Environmental performance	Score	10.5%
3.5) Participation in multilateral agreements		10.5%
3.5.1) Human rights treaties	Score	
3.5.2) Environmental treaty ratifications	# of ratifications	

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