EMOTION AND COGNITION IN THE AGE OF AI

White paper

About this survey

Emotion and cognition in the age of AI is an Economist Intelligence Unit report commissioned by Microsoft. It explores, via an international survey, expert interview panel and academic literature review, how educators view the relationship between emotional well-being and learning. Covering attributes including resilience, self-regulation, emotional literacy, autonomy and mastery, the research engaged 762 educators across 15 countries*, from primary and secondary level teachers to support officers, administrators and school leaders. The following experts also generously gave their time. We would like to thank them for their participation:

- **Andreas Schleicher,** director, Directorate of Education and Skills, OECD
- **Dr Alejandro Adler**, director, International Education, Positive Psychology Center, University of Pennsylvania
- **Meik Wiking**, author, and founder, The Happiness Research Institute
- **Gabriel Heller-Sahlgren**, research director, Centre for Market Reform of Education
- **Dr Marc Brackett**, founding director, Yale Center for Emotional Intelligence
- **Dr Lim Lai Cheng**, executive director, SMU Academy, Singapore Management University
- **Kate Sachs Leventhal**, chief project officer, CorStone
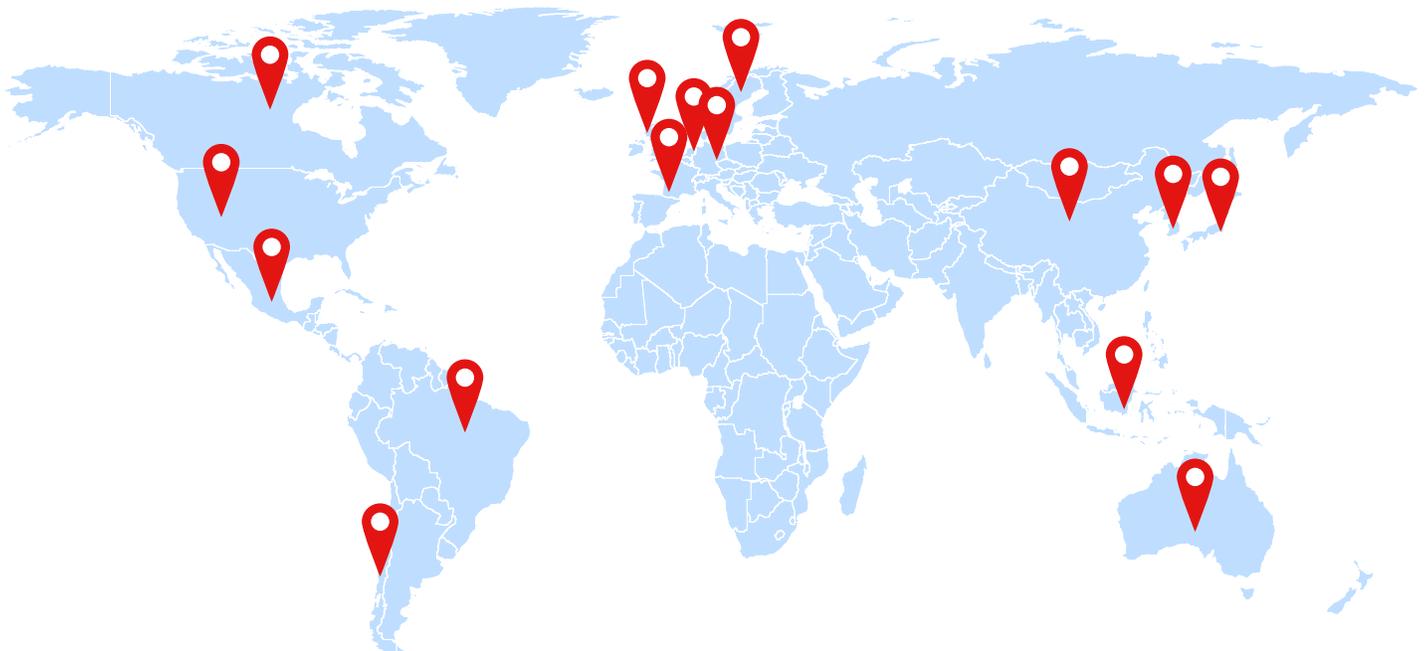
* Australia, Brazil, Canada, Chile, China, France, Germany, Indonesia, Japan, Mexico, the Netherlands, South Korea, Sweden, the UK and the US.

Executive summary

Schools have long recognized the importance of emotional well-being in their students, but primarily as a form of pastoral care, in reaction to trauma or distress. A growing network of teachers, pedagogy researchers and psychologists now call for a more foundational integration of social and emotional learning that recognizes how mindsets and moods shape children's ability to acquire knowledge and understand themselves and the fast-changing world around them. In the 21st century, with artificial intelligence (AI) and automation reshaping work and life, there is growing fear that process-driven jobs will be done by robots, with increasing unemployment affecting the humans that once carried them out. Skills centered in the interpersonal, empathic and creative realms could become the key human differential in the labor market of tomorrow, and those with strengths in these domains—innate or acquired—will be best placed to prosper.

How do educators view social and emotional learning? Are they putting in place policies and programs to support well-being and the development of psychosocial assets such as resilience, autonomy and self-regulation? And what forms do these policies and programs take? This report, informed by an expert advisory panel and a global survey, explores the integration of emotional well-being, social learning and cognition in education systems across the continents.

Key findings:

Educators around the world view well-being as an engine of cognition and learning. Seventy-nine percent of educators believe positive emotions are "very" or "extremely" important for helping students to achieve academic success, and support for well-being as an educational issue spans varied cultural, social and economic contexts across Asia, Latin America, North America, Australia and Europe. Substantial majorities say that emotional well-being is "very" or "extremely" important for developing foundational literacies (77%) such as reading and mathematics, and for emotional literacy (82%), communication skills (81%) and critical thinking (78%). Recognizing the rise in anxiety and depression among young people, and the changing labor markets they face in the AI age, seven out of ten educators believe that emotional well-being has grown more important since they started their career.

Half of schools have well-being policies in place; the remainder are developing formal policies or promoting emotional health in *ad hoc* ways. Fifty-three percent of schools have an explicit well-being policy in place. The remainder are either developing a well-being policy (23%) or support well-being in more *ad hoc* ways. Only 3% have no policy or plans to develop one. Current approaches include mindfulness lessons, resilience training, emphasis on self-directed learning, reducing examinations and workload pressure, emotional "charters", restorative over punitive disciplinary tactics, group work to encourage social learning, exposure to nature, and even adjusting school hours to increase students' sleep time.

Optimal strategies include support for teachers' well-being, involve the collection and analysis of rigorous subjective and objective data, and are school-wide. Teachers can suffer burnout, as their roles are administratively complex, workload-heavy and emotionally demanding. As such, experts argue that a holistic strategy must also nurture teacher well-being; 72% of respondents believe a teacher's mood influences the well-being of children, while an inclusive and safe class environment, which teachers define and create, has a positive effect on child well-being, according to 83% of respondents. Practitioners also advise against sporadic pilots or isolated programs. Well-being policies must be school-wide, with emotions conceived as an engine of learning rather than a form of pastoral care.

Tech's double-edged implications for well-being. The rise of education technology has made learning more personalized and engaging, while advances in affective and behavioral computing are assisting students who have disabilities like autism. Collaborative platforms are opening new spaces for group work, and amplifying students' voices. Virtual and augmented reality are being used to develop social skills like empathy and understanding the world from other people's perspectives, helping to teach about issues like social marginalization and racial, ethnic or gender biases, among others. However, digital devices and social media platforms may worsen youth problems like bullying and social anxiety, and are linked—in some use cases, devices and applications— to sleep disruption, and to distractions and difficulty in concentrating. Innovators and educators must work to advance an educational technology agenda that supports social and emotional health and distinguish between helpful and harmful uses of technology.

What happens in and around the classroom shapes young people's state of mind and emotional development, from the nutrition and physical exercise provided, to the quality of their relationships with teachers and peers.

Introduction: A well-being agenda for 21st century children

For much of the 20th century, psychology hinged on a pathological concept of mental health. Abnormalities, from the severe disorders to the subclinical, were the target. The goal was fault-fixing through psychoanalytical or pharmacological means, or both.

Some researchers grew uneasy with this paradigm, arguing that health was an active, dynamic state, not merely disease's absence. Positive emotions, resilience, optimism and a sense of control over life all required nurturing. A "positive psychology" field emerged, identifying the ingredients of a healthy emotional and mental outlook and ways those could be encouraged. Work by Martin Seligman, Mihaly Csikszentmihalyi and Kennon Sheldon laid crucial foundations.[1,2,3] The PERMA model, developed by Dr Seligman, became one influential framework for the elements constitutive of happiness: **P**ositive emotions, **E**ngagement or flow, positive **R**elationships, **M**eaning and **A**ccomplishment.[4] Another was developed by Carol Ryff, conjuring six components of well-being: self-acceptance, purpose in life, environmental mastery, positive relationships, personal growth and autonomy.[5]

Initially confined to academia, positive psychology and happiness research have recently entered policy discourse. The concept of Gross National Happiness was first proposed back in the 1970s by the fourth Bhutanese king, King Jigme Singye Wangchuck. Fast forward to 2008, and a commission assembled by France's then president, Nicolas Sarkozy, concluded that GDP was an inadequate metric to gauge citizen well-being.[6] Two years later, the then UK prime minister, David Cameron, pledged to statistically monitor "national happiness". Soon after, the UN adopted a resolution to encourage member states to pursue public policy steps to "better capture the importance of pursuing happiness and well-being in development".[7]

To achieve the UN's goal, the education sector is key. What happens in and around the classroom shapes young people's state of mind and emotional development, from the nutrition and physical exercise provided, to the quality of their relationships with teachers and peers. "Child well-being is not something you can easily delegate to families and social environments; schools need to take a more explicit role," says Andreas Schleicher, director for the Directorate of Education and Skills at the OECD.

How readily do educators themselves accept well-being as part of their role? Historically, monitoring emotional and mental health was largely considered a pastoral duty to identify

1. M Seligman and M Csikszentmihalyi, "Positive Psychology: An Introduction", *American Psychologist*, January 2000, https://www.ncbi.nlm.nih.gov/pubmed/11392865
2. R Ryan and E Deci, "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-being", *American Psychologist*, January 2000, https://selfdeterminationtheory.org/SDT/documents/2000_RyanDeci_SDT.pdf
3. K M Sheldon and S Lyubomirsky, "Achieving sustainable new happiness: Prospects, practices, and prescriptions", appears in A Linley and S Joseph (Eds), *Positive psychology in practice*, 2004, pages 127-145
4. A Adler and M Seligman, "Using wellbeing for public policy: Theory, measurement, and recommendations", *International Journal of Well-being*, 2016, https://internationaljournalofWell-being.org/index.php/ijow/article/viewFile/429/533
5. C Ryff, "Psychological Well-Being Revisited: Advances in Science and Practice", *Psychotherapy and Psychosomatics*, November 2013, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4241300/
6. J E Stiglitz, A Sen and J P Fitoussi, "Report by the Commission on the Measurement of Economic Performance and Social Progress", https://ec.europa.eu/eurostat/documents/118025/118123/Fitoussi+Commission+report
7. UN, "Adopting Resolution on Multilingualism, General Assembly Emphasizes Importance of Equality among Six Official United Nations Languages", https://www.un.org/press/en/2011/ga11116.doc.htm

students experiencing problems and refer them to relevant support services. Some institutions might endeavor to tackle problems like bullying, invest in extra-curricular engagement or improve nutrition and physical exercise regimens, but the extent of these efforts was largely reliant on the resources of the school or the inclinations of individual teachers or school leaders.

At the margins, a more ambitious agenda emerged. Maria Montessori, a 20th century educationalist, emphasized a "whole-child" approach that offered a supportive environment for self-directed activity, choice and independent learning, as opposed to didactic teaching. The focus on intellectual, physical, emotional and social development is "a very different goal to that of most education systems today, where the focus is on attainment in academic subjects such as literacy and mathematics", argued one study.[8] The 1970s saw some uptake of whole-child ideas, says Alejandro Adler, the director of International Education at the Positive Psychology Center of the University of Pennsylvania, and a corresponding increase in emotional and skills-based learning inspired by models like Montessori and Waldorf education, based on the theories of Rudolf Steiner. Yet institutions dedicated to whole-child pedagogical practices have been few in number.[9]

Thanks to the academic richness of well-being research, and the attention given to it by policy communities, the wider educational establishment is today picking up the baton.

Defining well-being

While there is no single definition of well-being, the broad concept covers two realms: emotional (the presence of positive emotional states and absence of negative affective states) and cognitive (life satisfaction as a whole).[10,11]

In recognition of well-being's impact on learning, and the education system's outsized role in shaping the emotional and mental health of young people, the OECD has measured student well-being as part of its Program for International Student Assessment (PISA) ranking since 2015. PISA defines well-being as "the psychological, cognitive, social and physical functioning and capabilities that students need to live a happy and fulfilling life,"[12] which includes the following elements:

- **psychological**, comprising students' sense of purpose, self-awareness, affective states and emotional strength;

- **social**, or students' quality of social lives, including relationships with family, peers and teachers, as well as a sense of social belonging at school;

- **cognitive**, referring to students' proficiency in using academic knowledge and soft skills to be lifelong learners, effective workers and engaged citizens; and

- **physical**, or the ability to follow a healthy lifestyle based on self-reported measures of physical activity and nutrition.

"Well-being has always been important to schools," says Mr Schleicher at the OECD. "What is more recent is this explicit attention to it as a construct amenable to policy. This is an interesting new development."

8. C Marshall, "Montessori education: a review of the evidence base", *npj Science of Learning*, October 2007, https://www.nature.com/articles/s41539-017-0012-7
9. Ibid
10. E Diener, E M Suh, R E Lucas and H L Smith (1999). "Subjective Well Being: Three Decades of Progress", *Psychological Bulletin*, 1999, Volume 125, No. 2, pages 276-302.
11. C Ryff, "Psychological Well-Being Revisited: Advances in Science and Practice", *Psychotherapy and Psychosomatics*, November 2013, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4241300/
12. OECD, "PISA 2015 Results Students' Well-being Volume III", pages 60-64, https://www.oecd-ilibrary.org/docserver/9789264273856-en.pdf?expires=1536843365&id=id&accname=guest&checksum=F58ED5FE27026D12F2946DC0B3008C26

A pivotal moment came a decade ago, with Dr Seligman's collaboration with Australia's Geelong Grammar School. Children were taught practices like "tuning into self-talk" to develop helpful thinking patterns, trained in resilience skills and engaged in "neuroplasticity projects" like juggling.[13] Geelong proved an early starter rather than a quirky outlier, and this fusion of positive psychology with education culminated in "positive education", a now-established research field in its own right.

By 2015 the Program for International Student Assessment began tracking student well-being as an indicator of an education system's performance[14] and now academic studies, from Bhutan, Mexico and Peru to the US, UK and Singapore, are proving that positive education is directly improving learning outcomes.[15] "We are at the beginning of a tectonic shift," says Dr Adler. "Rather than seeing well-being as an add-on, it is becoming a second strand to the helix: one being academic performance, the second being well-being and character development."

Practitioners say the growing spotlight on character, mood and emotions are a major advance on subject-based pedagogy. "In so many of the outcomes that people have been working on for decades—in youth development, improved education outcomes, improved livelihoods—there has been an important piece that is missing; the internal and psychosocial aspects that really go into being a resilient person," says Kate Sachs Leventhal, chief project officer at CorStone,

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> **Emotions drive attention and learning. How we feel influences our ability to learn and if teachers aren't aware of that, they may not be creating the best environment for learning to occur in the classroom.**
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> *Marc Brackett, Yale Center for Emotional Intelligence*

a non-governmental organization that works with children, and especially girls, in countries including India and Kenya.

"If you have internal and psychosocial assets, you will be able to confront adversity, and handle challenge and crisis in a way that allows you to not only bounce back to the level you were before that difficulty, but to grow from it and to use that as a catalyst to thrive," says Ms Sachs Leventhal. Dr Adler agrees: "These skills are necessary not just to do well in school but in life, in your personal life, in your marriage, to prevent psychological maladies, depression and anxiety, and substance abuse like the opioid crisis." But he believes there is much further to go. "The silo we are now trying to break is bridging academic research in psychology and happiness science, together with pedagogical research. There are compartmentalized worlds of researchers and practitioners. Researchers might think they are doing [the] right work but it is too separate from what happens in the classroom."

13. Geelong Grammar School, "About Positive Psychology", https://www.ggs.vic.edu.au/School/Positive-Education/What-is-Positive-Education-/About-Positive-Psychology
14. OECD, "PISA in focus: Do teacher-student relations affect students' well-being at school?", 2015, https://www.oecd.org/pisa/pisaproducts/pisainfocus/PIF-50-%28eng%29-FINAL.pdf
15. A Adler, "Teaching Well-Being increases Academic Performance: Evidence From Bhutan, Mexico, and Peru", Publicly Accessible Penn Dissertations, 2016, https://repository.upenn.edu/cgi/viewcontent.cgi?article=3358&context=edissertations

Chapter 2: Engaged educators

In order to better understand how educators view the place of well-being in learning—and what they are doing to bring the latest well-being science to the classroom—The Economist Intelligence Unit conducted a global survey of 762 educators across 15 countries. The poll found that 79% believe positive emotions to be "very" or "extremely" important for helping students achieve academic success, and 77% believe that emotional well-being is "very" or "extremely" important for the development of foundational literacies such as reading and mathematics. Their answers suggest that most educators do not see emotions as a matter to be attended to after-hours or in parent meetings; they are foundational to learning.

These beliefs are being backed by action, with 53% reporting that they work in schools with a formal well-being policy in place and the remainder either developing a policy or encouraging well-being without any school-wide approach. Only 3% said their institution had no policy and no plans to develop one. What forms do these policies and programs take? Surveying the academic literature, they divide into two broad categories. First, the "taught curriculum" introduces concepts in specific, age-appropriate ways. The second category is the "caught" curriculum, the culture or tone of the school, manifested in the way that pupils interact with one another and their teachers.[16] The remainder of this chapter examines case studies and empirical evidence for critical well-being attributes, including emotional self-regulation, relationships, autonomy, mastery and physical health, as well as less common factors such as exposure to nature and sleep.

53% of schools have an explicit well-being policy in place

53%
Formal well-being policy in place

23%
Developing policy

21%
Encourage well-being without school-wide approach

3%
No policy and no plans to develop one
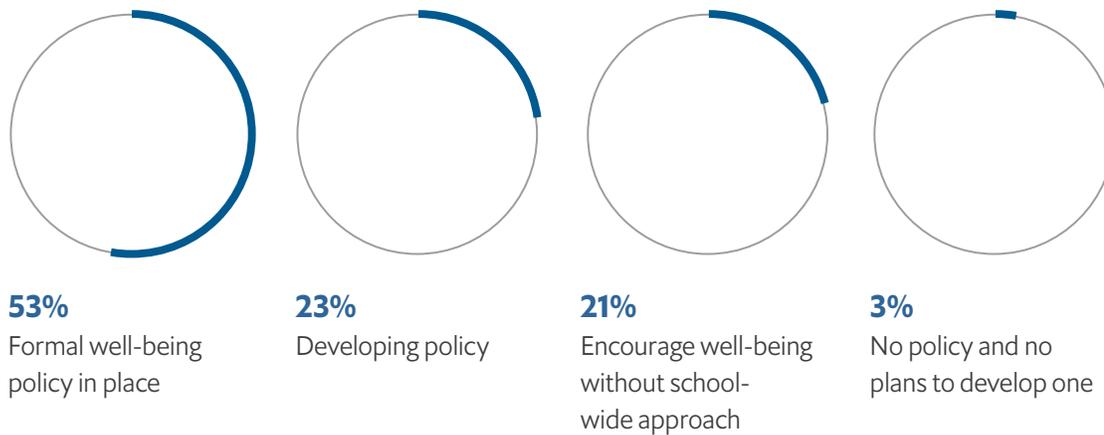
16. M A White and M L Kern, "Positive education: Learning and teaching for wellbeing and academic mastery", *International Journal of Wellbeing*, 2018, http://internationaljournalofwellbeing.org/ijow/index.php/ijow/article/view/588/635

Mindfulness and self-awareness: "If you can name it, you can tame it"

Recognizing emotions like anxiety, rumination or depression can minimize their potential to harm. So-called mindfulness approaches, in which an individual is encouraged to observe their thoughts and emotions objectively, and not identify with or react to them, are showing good results. One program, delivered by a psychologist to troubled students in a Singaporean elementary school, achieved positive outcomes for school and home behavior, self-control, social skills and self-esteem.[17] A Mindfulness-Based Stress Reduction intervention in Germany demonstrated positive impacts on stress reduction, self-regulation, self-efficacy and relationships[18] and has been adapted for primary schools through exercises like "mindful eating", "watching the thought parade" and "feelings practice".[19,20]

Tools now exist to help educators introduce mindfulness. The RULER system, developed by the Yale Center for Emotional Intelligence, teaches the skills of **R**ecognizing, **U**nderstanding, **L**abeling, **E**xpressing and **R**egulating emotions. Social and emotional learning approaches result in significant shifts in academic competencies, including improvements in learning.[21] Gratitude diaries, in which students periodically write down aspects of their life for which they are

Emotional self-regulation and mindfulness are not about avoiding difficult emotions or suppressing them—and emotional well-being does not mean simply making children comfortable and superficially happy

grateful, are another tool that has been shown to enhance children's mental well-being.[22,23] Such approaches are not just for students; they are also crucial for teachers and administrative staff.[24]

Importantly, emotional self-regulation and mindfulness are not about avoiding difficult emotions or suppressing them—and emotional well-being does not mean simply making children comfortable and superficially happy. "I think of all emotions as constructive, as having a function," says Marc Brackett, founding director of the Yale Center for Emotional Intelligence. "If all you are doing is trying to make kids happy you are doing a disservice to their learning and well-being. Being angry is very healthy and adaptive, being disappointed is important, feeling guilt is good. The goal is not to take away those emotions but to instill balance."

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> **Being angry is very healthy and adaptive, being disappointed is important, feeling guilt is good. The goal is not to take away those emotions but to instill balance.**
>
> *Marc Brackett,*
> *Yale Center for*
> *Emotional Intelligence*

17. L S Yeo and P M Choi, "Cognitive-behavioural therapy for children with behavioural difficulties in the Singapore mainstream school setting", 2011, https://journals.sagepub.com/doi/abs/10.1177/0143034311406820?journalCode=spia

18. S Gouda et al, "Students and Teachers Benefit from Mindfulness-Based Stress Reduction in a School-Embedded Pilot Study", *Frontiers in Psychology*, 7:590, 2016, https://www.frontiersin.org/articles/10.3389/fpsyg.2016.00590/full

19. A Saltzman and P Goldin, Chapter 7, *Acceptance and Mindfulness Treatments for Children and Adolescents*, http://www.stillquietplace.com/wp-content/uploads/2011/11/Saltzman-Grecco-2.pdf

20. J Kabat-Zinn, *"Full Catastrophe Living"*, 2013, https://books.google.co.uk/books?id=fIuNDtnb2ZkC&dq=full+catastrophe+living&hl=en&sa=X&ved=0ahUKEwiErMKJiYbgAhWzTBUIHbVmA_IQ6AEIKjAA

21. RULER, "What is Ruler?", http://ei.yale.edu/ruler/ruler-overview/

22. Emmons, R. A., & Mishra, A. (2011). Why gratitude enhances well-being: What we know, what we need to know. In K. M. Sheldon, T. B. Kashdan, & M. F. Steger (Eds.), *Series in positive psychology. Designing positive psychology: Taking stock and moving forward* (pp. 248-262). New York, NY, US: Oxford University Press.

23. A Peterson et al, "Understanding innovative pedagogies: key themes to analyse new approaches to teaching and learning: OECD Education Working Paper No 172", 2018, http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP(2018)8&docLanguage=En

24. M Brackett and S Rivers, "Transforming Students' Lives with Social and Emotional Learning", http://ei.yale.edu/wp-content/uploads/2013/09/Transforming-Students%E2%80%99-Lives-with-Social-and-Emotional-Learning.pdf

Relationships

Relationships shape all aspects of learning and school life. Positive relationships with teachers enable secure attachment and provide "scaffolding" for developing social skills,[25,26] while secure relationships with peers and parents influence motivation and achievement.[27,28] Toxic relational dynamics like bullying, fear of teachers, or parental or teacher disinterest, can be immobilizing. "Many students report high levels of stress from tests. You might think this has to do with frequency or demands for tests, but that's not the case," says Mr Schleicher. A bigger cause of stress, he says, is when a student feels unsupported by their teachers in the examination preparation and execution process.

Disciplinary strategies set the relational tone. In New Zealand, recurring features of primary and secondary level schools that score highly on well-being included an emphasis on restorative rather than punitive disciplinary practices.[29,30] Approaches were grounded in the work of Angus Macfarlane,[31] which proposed an "educultural" framework, based on the Māori emphasis on human relationships that values inclusion and the formation of a secure, democratic and positive classroom environment.[32] The survey shows broad support for such approaches, with 83% agreeing that an environment in which students feel "safe and supported to express themselves" had a positive impact on well-being. The school environment is thus an area in which educators make fast and impactful positive changes.

Positive relationships are important both inside and outside the classroom
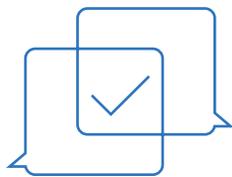
79%
think positive, stable relationships are important to academic success

83%
think a supportive home environment impacts emotional well-being

75%
believe a feeling of community and belonging impacts academic success

25. E Gallagher, "The Effects of Teacher-Student Relationships: Social and Academic Outcomes of Low-Income Middle and High School Students", NYU Steinhardt Department of Applied Psychology, accessed August 2018, https://steinhardt.nyu.edu/appsych/opus/issues/2013/fall/gallagher
26. D Granot, "The Contribution of Homeroom Teachers' Attachment Styles and of Students' Maternal Attachment to the Explanation of Attachment-like Relationships between Teachers and Students with Disabilities", *American Journal of Educational Research*, 2014, http://www.sciepub.com/reference/67623
27. K Wentzel, "Social Relationships and Motivation in Middle School: The Role of Parents, Teachers, and Peers", *Journal of Educational Psychology*, 1998, https://www.researchgate.net/publication/232448076_Social_Relationships_and_Motivation_in_Middle_School_The_Role_of_Parents_Teachers_and_Peers
28. M A Powell et al, "Wellbeing in schools: what do students tell us?", *The Australian Educational Researcher*, 45:515 2018, https://link.springer.com/article/10.1007/s13384-018-0273-z
29. Education Review Office, "Wellbeing for Children's Success at Primary School", https://www.ero.govt.nz/publications/wellbeing-for-childrens-success-at-primary-school/
30. Education Review Office, "Wellbeing for Young People's Success at Secondary School", https://www.ero.govt.nz/publications/wellbeing-for-young-peoples-success-at-secondary-school/
31. NZCER, Angus Macfarlane, https://www.nzcer.org.nz/taxonomy/term/295
32. The New Zealand Curriculum Online, "Working as a community", http://nzcurriculum.tki.org.nz/Inclusive-practices/Implementing-an-inclusive-curriculum/Working-together/Working-as-a-community

Autonomy

The word "school" derives from the Greek *scholé*, which originally referred to a "mode of freedom and self-determined activity".[33] Self-determination theory argues that a positive educational environment sustains and stimulates children's natural curiosity and motivation to learn, reducing the need for external controls.[34]

Singapore's "teach less, learn more" strategy, rolled out in 2005, was informed by students' need for autonomy and space. It simplified and streamlined the syllabus in part to free up time for students to participate in "non-academic enrichment" such as character-building programs.[35] "That came from the prime minister himself, to make sure that schools cut curriculums so that you don't push so much content that there's very little space for conceptual understanding at the experiential level," says Lim Lai Cheng, executive director of the SMU Academy at Singapore Management University. Faced with an emerging challenge of stress and anxiety among young people, often linked to grades and exams,[36] the government and schools are now reforming their educational strategy, including reducing the number of examinations, and doing away with publishing exam results, which stoke competitiveness and anxiety.

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Self-determination theory argues that a positive educational environment sustains and stimulates children's natural curiosity and motivation to learn, reducing the need for external controls.

Finland, another high education performer globally, has also attracted attention for the comparatively late start of its formal schooling system (at age seven),[37] its light homework regimen and school hours, and its emphasis on the cognitive value of play.[38] Advocates say "free-play" and "teacher-directed play" foster learning, including via developing attention span, perseverance and problem-solving, and socialization skills. This also provides an opportunity for schools to work more closely with parents and stakeholders outside of the school system.

33. S Gouda et al, "Students and Teachers Benefit from Mindfulness-Based Stress Reduction in a School-Embedded Pilot Study", *Frontiers in Psychology*, 7:590, 2016, https://www.frontiersin.org/articles/10.3389/fpsyg.2016.00590/full
34. C Niemiec and R Ryan, "Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice", *Theory and Research in Education*, June 2009, http://journals.sagepub.com/doi/abs/10.1177/1477878509104318?journalCode=trea
35. National Library Board, "Teach Less, Learn More", http://eresources.nlb.gov.sg/infopedia/articles/SIP_2018-03-21_105159.html
36. *The Straits Times*, "Singapore students suffer from high levels of anxiety: Study", https://www.straitstimes.com/singapore/education/spore-students-suffer-from-high-levels-of-anxiety-study
37. *The Guardian*, "No grammar schools, lots of play: the secrets of Europe's top education system", https://www.theguardian.com/education/2016/sep/20/grammar-schools-play-europe-top-education-system-finland-daycare
38. Ibid

Mastery

Positive education should not be equated with merely tending to students' comfort and enjoyment. Learning involves the judicious application of constructive pressure that ensures a child undertakes difficult tasks.

Gabriel Heller-Sahlgren, research director at the Centre for Market Reform of Education, believes the learning process must sometimes be tedious and hard. "The only way to learn, if you are not an expert learner, is through traditional means: rote learning and memorization. This is necessary because we need to shower our memory with serotonin, to move information from working memory to long-term memory. Only then can we quickly use it when we need to solve a problem." While children might enjoy self-directed learning, "if they don't have the tools to solve a problem they are going to spend a lot of time trying to understand the problem. If you don't put anything in your long-term memory, nothing has

been learned, since your working memory is 30 seconds." Processes that students might consider tedious—drill, rote learning, memorization—are crucial tools for learning, he says.

Learning requires some discipline and structure, which can necessitate hierarchical instruction and emotionally ambiguous or even negative states like frustration. Deliberate practice is one approach of purposefully focused training, often designed by teachers and coaches, geared to improving specific tasks, usually at which the learner is weakest.[39] Cognitive disfluency, in which learning is artificially made more difficult, such as reading in unfamiliar or broken fonts, has also been shown in studies to improve retention and learning depth.[40] Such evidence indicates that well-being should not be equated only with the superficial comfort of students, and it should not be assumed that students will naturally seek out difficult material to master.

Mastery and challenge

82%
believe students benefit from challenges they can overcome

82%
think extracurricular activities have a positive effect on well-being

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39. K A Ericsson, "Deliberate practice and acquisition of expert performance: a general overview", *Academic Emergency Medicine*, 2008, https://www.ncbi.nlm.nih.gov/pubmed/18778378
40. The Chronicle of Higher Education, "The Benefits of Making it Harder to Learn", https://www.chronicle.com/article/The-Benefits-of-Making-It/132056

Persistence and resilience

Research at the West Point military academy, where a tough regimen results in high drop-out rates, has shown that conventional success indices like aptitude, leadership and physical ability were not fully predictive of completion rates, with non-aptitude and non-cognitive factors, notably grit and hardiness, warranting more recognition.[41,42] The work of Carol Dweck has also shown that a "growth mindset", in which ability is seen as modular and capable of change, is crucial for learning and life success, while a "fixed" mindset, which assumes that intelligence and talent are fixed and immutable, is not.[43] Resilience does not mean mindless rule-following. But where the end goal is one the individual genuinely seeks, rather than being imposed on them, resilience is a crucial character trait both in learning and life.

Schools are advancing programs that develop grit and resilience in children. St Peter's College, in Adelaide, teaches resilience strategies tailored by age group, from "Bounce Back!" (years 1-5) to more advanced instructions delivered to years 7 through 12.[44] Strengths-based approaches spot the innate ability of pupils to find their way through difficulty. One structured questionnaire asked 198 questions exploring 24 "character strengths"—including bravery, fairness, leadership and perseverance. On completion, students were provided feedback on their top five strengths, providing a starting point to explore how those could be further developed.[45]

Another study, delivered in a large US urban school district with an 89% ethnic and racial minority population with a high violence exposure, focused on 9th graders, a critical dropout year.[46] A resilience curriculum delivered by social workers over nine modules focused on skills including relationships, managing stress reminders and goal-setting, including through storytelling approaches. They found significantly improved overall internal resilience and improved scores in problem-solving and empathy. The focus on disadvantaged youth is warranted since resilience is paradoxically both an internal resource that is also enabled by their environment. One UK-based study identified 11 key resilience factors—these included having an adult the child trusts in their life, feeling safe and having help to map out their future.[47]

In Singapore, the shift away from examination-heavy pedagogy is also in part based on an appreciation that character development is crucial to developing grit; not just for the individual but even for the country. "When we moved away from focusing so much on grades and instead talking about character and values, this was to make sure that there is a sense of anchoring for our students," says Dr Lim. "When calamities and adversities strike our nation, we want people to come together and beat the odds, rather than just emigrate and find a better life for themselves."

Schools are advancing programs that develop grit and resilience in children.

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45. Geelong Grammar School, "Model for positive education", https://www.ggs.vic.edu.au/Positive-Education2/Model-for-Positive-Education

46. R Ijadi-Maghsoodi et al, "Adapting and Implementing a School-Based Resilience-Building Curriculum Among Low-Income Racial and Ethnic Minority Students", *Contemp School Psychol*, 2017, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5909715/

47. Professor Angie Hart and Dr Becky Heaver, "Resilience Approaches to Supporting Young People's Mental Health: Appraising the Evidence Base for Schools and Communities", https://www.boingboing.org.uk/wp-content/uploads/2017/02/bb-guide-to-school-community-resilience-programmes-2015a.pdf

Nature and physical health

Physical activity, diet, sleep and access to nature provide cognitive, learning and well-being benefits. In primary and secondary education, engagement with nature and spending time outdoors has been essential to Scandinavia's world-class education culture. The Danish Forest Schools approach, and the wider region's cultural emphasis on outdoor play, are informed by a belief that children's interaction with nature fosters positive attitudes towards the natural environment, and develops character through mechanisms including risky play, teamwork and social cohesion. One evaluation suggests that blending periods of Forest School with traditional classroom-based learning throughout the year offers more benefit than either approach on its own.[48] Schools are also supporting children's engagement with nature through, for example, using playground spaces to grow food or plants (air pollution, by contrast, appears to have a negative impact on cognition, at least in older people).[49]

While other broad health indicators like physical activity and nutrition have well-understood linkages to cognition and learning, a hitherto under-appreciated factor is sleep. Research shows that sleep sets off restorative neural detoxification processes, and is crucial to the consolidation of memories and learning. While schools might consider this the responsibility of parents, school hours affect daily sleep cycles. In 2016 some Seattle public schools delayed the start of school by 55 minutes. Follow-up evaluations found subsequent improvements in attendance and grades.[50]

Technology and emotions

There has been a good deal of focus on the negative effects of technology on children's well-being, including the rise of cyber-bullying, social media-linked anxiety, inferiority and alienation, and body dysmorphia in the photo-saturated landscape young people now inhabit.[51] Yet appropriately developed technology can also support well-being, empathy, social learning and emotional intelligence. AI has made great strides in education, particularly when used in interactive software designed to raise confidence through self-directed learning. AI-powered teaching platforms can offer questions that increase in difficulty for correct responses, and provide explanations for incorrect answers. This trial-and-error process may help reduce anxiety and remove the intimidation students feel in answering questions in a traditional teacher-directed classroom.

Behavioral and affective computing relying on AI can have profound effects in autism research. Scientists at five European universities have developed Zeno, which is an AI-based robot that interacts with autistic children in real-time, helping them better understand and express their emotions through facial and audio recognition technology.[53] While autistic children may prefer avoiding human contact, the robot has proven effective in interacting with children through a game that prompts them to identify and display emotions.

Research shows that sleep sets off restorative neural detoxification processes, and is crucial to the consolidation of memories and learning.

48. J K Coates and H Pimlott-Wilson, "Learning while playing: Children's Forest School experiences in the UK", *Br Educ Res J*, 2018, https://onlinelibrary.wiley.com/doi/abs/10.1002/berj.3491
49. Xin Zhang, Xi Chen, and Xiaobo Zhang, "The impact of exposure to air pollution on cognitive performance", *PNAS*, 2018, 115 (37) 9193-9197, https://www.pnas.org/content/115/37/9193
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51. *The Independent*, "'Snapchat Dysmorphia': Teenagers are Getting Plastic Surgery to Look Like Selfie Filters", https://www.independent.co.uk/life-style/plastic-surgery-cosmetic-snapchat-teenagers-millennials-dysmorphia-bdd-a8474881.html
52. Mindspark website, https://www.ei-india.com/mindspark-maths; and *The Economist*, "In poor countries technology can make big improvements in education", https://www.economist.com/international/2018/11/17/in-poor-countries-technology-can-make-big-improvements-to-education
53. Imperial College London, "Robot 'teacher' to help children with autism developed by scientists", https://www.imperial.ac.uk/news/177318/robot-teacher-help-children-with-autism/

Research by the MIT Media Lab has taken robot therapy one step further in personalizing engagement with autistic children by leveraging physiological data such as body movements, temperature and heart rate.[54] Virtual reality has shown promise in supporting social and emotional learning by teaching empathy. Classrooms can use content such as 360-degree videos produced by *The New York Times* to experience life as a refugee, for example.[55] Meanwhile, research at Stanford University has shown that embodying an avatar of a different race can help reduce racial bias.[56] Real Lives, a "simulation engine", allows students to walk a few miles in someone else's shoes, allowing students to experience situations in other cultures and contexts to their own. Teachers have used it to inform teaching of critical concepts like distributive justice. The platform also allows students to experience life at different ages, and to make decisions on the different kinds of problems that emerge at different life stages.

The use of immersive technology to take virtual field trips can ignite students' curiosity and deepen the learning experience. A virtual tour of the Amazon can be part of a lesson on deforestation, for instance.[57] Likewise, virtual tours can encourage student exploration and confidence in STEM (science, technology, engineering and mathematics) subjects, raise cultural awareness of foreign lands and provide a historical perspective on ancient civilizations.

Dr Adler calls for education practitioners to see technology as a tool rather than a predetermined outcome. "Technology will be the fulcrum, the main infrastructure and medium through which large-scale high-quality education can and should be disseminated. We should look at it positively. We know that in adolescents, you are not going to decrease the amount of time they are spending on devices. Why not use existing access points—tablets, phones, computers and social media—to digitize educational materials; and sometimes 'game-ifying' when we digitize, so it is not only skills and knowledge building but also fun and engaging?"

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Technology will be the fulcrum, the main infrastructure and medium through which large-scale high-quality education can and should be disseminated. We should look at it positively.

Alejandro Adler,
University of Pennsylvania

54. MIT News, "Personalized 'deep learning' equips robots for autism therapy", http://news.mit.edu/2018/personalized-deep-learning-equips-robots-autism-therapy-0627
55. *The New York Times*, "NYT VR: How to Experience a New Form of Storytelling from the Times", https://www.nytimes.com/2015/11/08/magazine/nyt-vr-how-to-experience-a-new-form-of-storytelling-from-the-times.html
56. Slate, "Can Virtual Reality Teach Empathy?", https://slate.com/technology/2017/02/can-virtual-reality-in-the-classroom-help-teach-empathy.html
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Best practices and guiding principles for well-ness education

The survey shows broad support for the principles of positive education, and proves that educators—from frontline teachers to school leaders, across varied contexts—see emotional well-being as constructive to learning. Surveying the empirical evidence of initiatives trialed so far, and the advice of experts involved in their design and execution, best practices and principles are emerging.

First, data gathering is important to identify students' mental and emotional health and track whether supportive measures are working. Self-assessment surveys are one option, through which students report their mood and feelings in a structured way. Technologies like tablets or smartphone apps can digitize data, allowing analytics and visualization to identify patterns. Yet surveys should be carefully designed. If imposed top-down, recipients at the "chalk face" might be excluded from defining what issues are important. More participatory approaches allow pupils to co-create both interventions and methods for drawing conclusions on their effectiveness.[58] Subjective reports also need

Data gathering is important to identify students' mental and emotional health and track whether supportive measures are working.

to be balanced with other approaches. "The breakthrough is going from subjective well-being, which implies people's own personal experiences with their emotions and lives, to objective well-being, which is less 'game-able' or subject to how people are feeling," says Dr Adler. "Positive and negative emotions fluctuate with time, and life evaluation fluctuates depending on how you are feeling when you are asked the questions. We now have more objective measures including on physical health, achievement and performance."

A second principle is that teachers must be involved in any well-being plan. "Every adult in the educational ecosystem is an important agent of change," says Dr Adler. "They are psychosocial nodes that define the socio-emotional and cultural fiber of education systems. If you want

Effective efforts require investment in expertise to design and deliver instruction and content that is empirically sound, and the training of teachers to deliver this content

64%
of teachers want to support student well-being but lack the resources or time
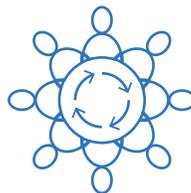
71%
think change needs to come from leadership level

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58. A J Halliday et al, "The student voice in well-being: a case study of participatory action research in positive education, Educational Action Research, 2018, https://www.tandfonline.com/doi/pdf/10.1080/09650792.2018.1436079?needAccess=true

to systemically and sustainably change systems, as tempting as it is to go straight to students as the end-beneficiaries, education systems and schools are only as good as [the] adults in them". The Economist Intelligence Unit's survey supports his argument; a teacher's mood or well-being was rated "extremely" or "very" influential on student well-being by 72% of respondents. "Emotional intelligence skills, and focusing on the culture and climate of school, are mechanisms for decreasing burnout. Schools that adopt these approaches have less stress and burnout among educators and staff," argues Dr Brackett.

Finally, interventions should not be limited to pilots and one-off forays. Effective efforts require investment in expertise to design and deliver instruction and content that are empirically sound, and the training of teachers to deliver this content. Nearly two-thirds of educators in the survey (64%) say a lack of resources and time prevents them supporting student well-being more. Holistic approaches also require buy-in from management. A majority of respondents (71%) think positive change has to come from the top.

Dr Brackett believes a holistic approach is crucial. "I am a strong advocate for systemic approaches. I am against quote unquote 'programs' because it doesn't shift the way all people that work in schools think and doesn't make everyone have that emotional education. I am pushing for schools to be systemic in their thinking around social and emotional learning." Dr Brackett favors a comprehensive model. "We work with leaders, teachers, students and families to address the climate of the school as well as instruction. There are explicit activities for leaders to do with faculty, and with their students. Tools include an emotional charter, which sets the emotional tone for the school."

Such a cohesive policy, supporting core ingredients that buttress emotional and mental health, through both the curriculum and outside-of-class activities, should not be the preserve of privileged schools. Instead, educators need to continue to build upon social and emotional learning as an essential part of their mandate. In so doing, they will better prepare their students to excel as learners today—and as citizens of tomorrow.

Educators need to continue to build upon social and emotional learning as an essential part of their mandate.

LONDON

20 Cabot Square
London, E14 4QW
United Kingdom
Tel: (44.20) 7576 8000
Fax: (44.20) 7576 8500
Email: london@eiu.com

NEW YORK

750 Third Avenue
5th Floor
New York, NY 10017
United States
Tel: (1.212) 554 0600
Fax: (1.212) 586 1181/2
Email: americas@eiu.com

HONG KONG

1301 Cityplaza Four
12 Taikoo Wan Road
Taikoo Shing
Hong Kong
Tel: (852) 2585 3888
Fax: (852) 2802 7638
Email: asia@eiu.com

GENEVA

Rue de l'Athénée 32
1206 Geneva
Switzerland
Tel: (41) 22 566 2470
Fax: (41) 22 346 93 47
Email: geneva@eiu.com

DUBAI

Office 1301a
Aurora Tower
Dubai Media City
Dubai
Tel: (971) 4 433 4202
Fax: (971) 4 438 0224
Email: dubai@eiu.com

SINGAPORE

8 Cross Street
#23-01 Manulife Tower
Singapore
048424
Tel: (65) 6534 5177
Fax: (65) 6534 5077
Email: asia@eiu.com