WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

Industry Agenda

New Vision for Education: Fostering Social and Emotional Learning through Technology

Prepared in collaboration with The Boston Consulting Group

March 2016

World Economic Forum®
2016 - All rights reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, including photocopying and recording, or by any information storage and retrieval system.

The views expressed are those of certain participants in the discussion and do not necessarily reflect the views of all participants or of the World Economic Forum.

REF 040316

Contents

4 **Executive summary**

6 **Chapter 1: Benefits and best practices in SEL**
- 6 The benefits of SEL
- 8 Best practices in SEL

11 **Chapter 2: The promise of education technology**
- 11 Capitalize on what works
- 13 Embed SEL into foundational ed-tech products
- 14 Expand the realm of the possible

18 **Chapter 3: What's holding back adoption of SEL technologies?**
- 18 Limited awareness of SEL and its benefits
- 19 Insufficient prioritization of social and emotional skills
- 19 Lack of consensus about valid and reliable SEL measurements
- 19 Low levels of funding and resources for SEL
- 20 Inadequate supply of SEL programmes and products

24 **Chapter 4: The way forward for SEL**
- 24 How global organizations shape the agenda
- 25 How country-level organizations advance the agenda
- 25 How individual stakeholders influence the agenda
- 26 How to foster collaboration among stakeholders

27 **Appendix 1: Definitions of SEL strategies**

28 **Appendix 2: Definitions of ed-tech features**

30 **Appendix 3: Education reform in action**
- 30 A central-government programme
- 31 A public-private partnership in a decentralized system
- 31 An NGO-led project in a developing country
- 31 A global campaign

32 **Appendix 4: Methodology**

33 **Acknowledgements**

34 **Endnotes**

Executive summary

To thrive in the 21st century, students need more than traditional academic learning. They must be adept at collaboration, communication and problem-solving, which are some of the skills developed through social and emotional learning (SEL). Coupled with mastery of traditional skills, social and emotional proficiency will equip students to succeed in the swiftly evolving digital economy.

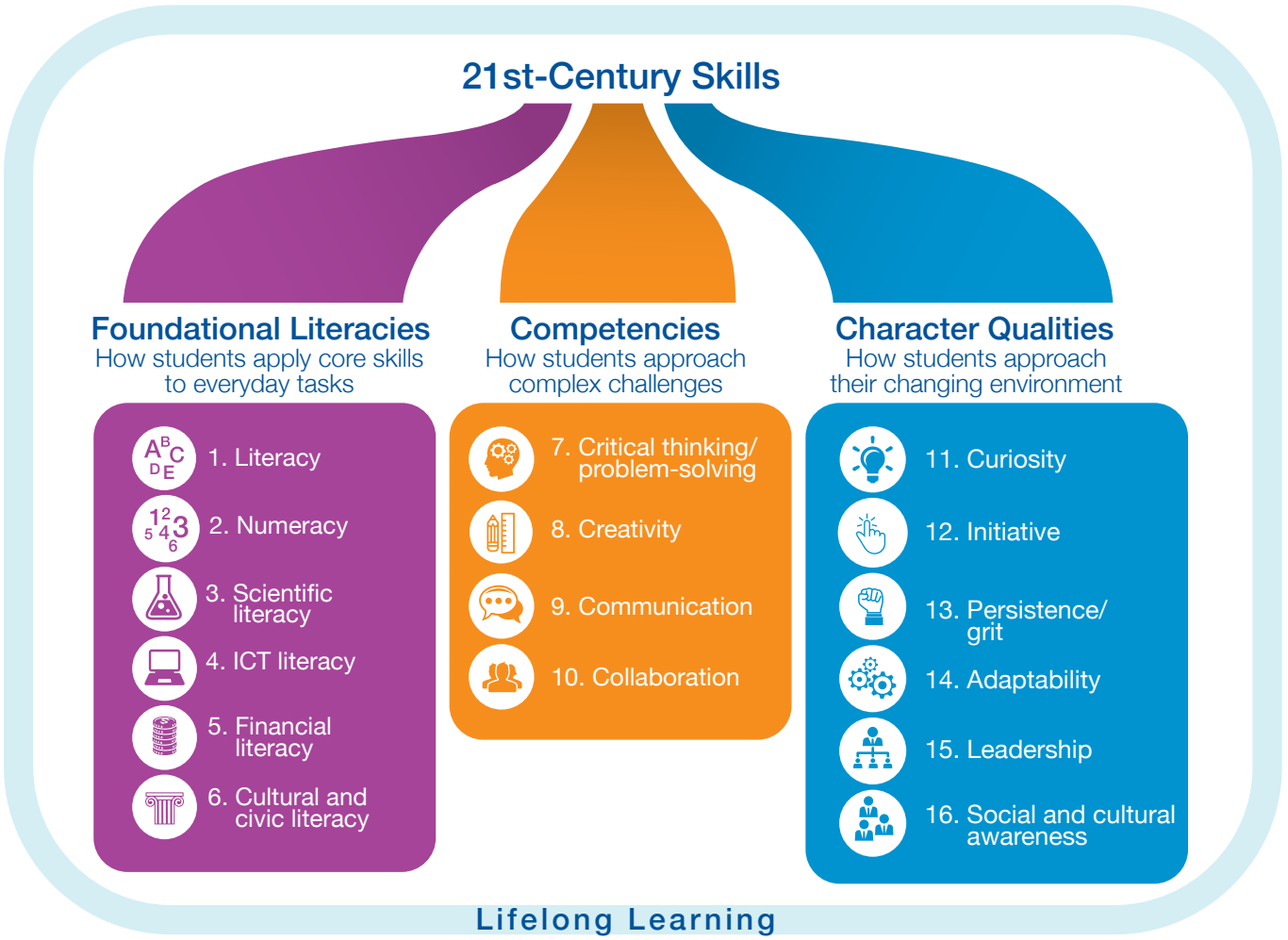
In 2015, the World Economic Forum published a report that focused on the pressing issue of the 21st-century skills gap and ways to address it through technology (*New Vision for Education: Unlocking the Potential of Technology*). In that report, we defined a set of 16 crucial proficiencies for education in the 21st century. Those skills include six "foundational literacies", such as literacy, numeracy and scientific literacy, and 10 skills that we labelled either "competencies" or "character qualities". Competencies are the means by which students approach complex challenges; they include collaboration, communication and critical thinking and problem-solving. Character qualities are the ways in which students approach their changing environment; they include curiosity, adaptability and social and cultural awareness (see Exhibit 1).

In our current report, *New Vision for Education: Fostering Social and Emotional Learning through Technology,* we follow up on our 2015 report by exploring how these competencies and character qualities do more than simply deepen 21st-century skills. Together, they lie at the heart of SEL and are every bit as important as the foundational skills required for traditional academic learning. Although many stakeholders have defined SEL more narrowly, we believe the definition of SEL is evolving. We define SEL broadly to encompass the 10 competencies and character qualities.[1] As is the case with traditional academic learning, technology can be invaluable at enabling SEL.

The advantage of SEL

As we explore in Chapter 1 of the report, social and emotional skills are critical to the workforce of the future. The kinds of skills that SEL addresses, such as problem-solving and collaboration, are increasingly necessary for the labour market. According to one estimate, 65% of children entering grade school will ultimately work in jobs that don't exist today, putting creativity, initiative and adaptability at a premium. Another study shows that jobs are increasingly

Exhibit 1: Students require 16 skills for the 21st century



Note: ICT stands for information and communications technology.

social-skills-intensive. SEL will prepare today's students for this evolving workplace, with consequent benefits for individuals, businesses, the economy and society. SEL confers academic success as well. A meta-analysis of 213 studies showed that students who received SEL instruction had achievement scores that averaged 11 percentile points higher than those who did not. And SEL potentially leads to long-term benefits such as higher rates of employment and educational attainment.

These valuable social and emotional skills can be developed at any point in a child's life, although it can be highly effective to introduce SEL early and embed it in the core curriculum throughout a child's schooling. Research suggests that early childhood is a critical period for attaining important skills – and also that augmenting such early learning at later ages is necessary, complementary and effective. Social and emotional skills can be taught in classrooms or at home but SEL is most potent if developed in both settings.

The opportunity of education technology

As we discuss in Chapter 2, education technology has the potential to play a pivotal role in fostering SEL efficiently and cost-effectively. We see technology as a tool that a parent, educator or caregiver can use to complement and extend the learning experience – especially given the host of emerging technologies that go beyond traditional screens. These innovations are capable of mixing the physical and virtual worlds and facilitating forms of human interaction impossible a decade ago. Technologies such as virtual, augmented and "mixed" reality; robots; video chats on mobile devices; and virtual tutors allow for a much less passive and more interactive experience.

To understand the landscape, we surveyed more than 2,000 educators and parents around the world, interviewed education and technology experts, analysed patterns of education-related venture-capital funding and assessed a host of education technology products. As a result, we have developed a high-priority list of the learning strategies and technology features that are most critical to promoting SEL.

We have also identified three key opportunities to use technology to advance SEL:

- **Capitalize on what works.** Parents, educators and caregivers can benefit from existing "ed-tech" products with features that already promote SEL. Standards based on SEL-related features can help identify products with the potential to have the greatest impact on teaching social and emotional skills.
- **Embed SEL into foundational ed-tech products.** Creatively embedding SEL features into products that support foundational academic skills such as literacy and numeracy can extend SEL to areas where the vast majority of investment is already flowing.
- **Expand the realm of the possible.** Innovative new technologies – such as wearable devices, virtual reality and apps – can enable students to master important social and emotional skills. Not only do these technologies embrace and extend tried-and-true ways of fostering SEL, they offer potential for exciting new learning strategies.

The challenges to overcome

Several barriers stand in the way of achieving the full benefits of SEL and related technologies, as we discuss in Chapter 3. They include limited awareness, insufficient prioritization, a lack of consensus about measurements, low levels of funding and resources and an inadequate supply of programmes and products. Further, stakeholders still lack consensus on the definition of SEL and a means of assessing implementation and measuring outcomes. Such a lack of agreement leads to poor accountability and inadequate resources.

Likewise, several barriers stand in the way of the widespread use of technology in classrooms. For example, while many parents and educators in our survey recognize that SEL matters and see the potential for ed-tech to build social and emotional skills, they do not fully understand which technologies hold the most promise or how best to use them. Teachers mainly regard technologies as useful tools for imparting foundational academic skills and improving class productivity, not for fostering social and emotional skills. Ed-tech adoption is further hampered, in many countries, by technological and infrastructure issues. Another barrier is the perception that technology is little more than additional screen time for children that threatens to displace human interaction.

Together, barriers such as these form a vicious circle that is slowing the adoption of SEL. But with the right approaches, stakeholders can increase the adoption of SEL programmes and related technologies.

The leading roles that stakeholders must play

To determine the way forward, we interviewed key stakeholders and extracted lessons from successful examples of education policy change. That analysis helped us to identify the global, country-level and individual stakeholders with a stake in advancing SEL and to frame the roles that each can play.

Based on our analysis of different situations that led to successful public policy change, we believe it will take the combined efforts of a group of stakeholders – including policy-makers, educators, parents, researchers, businesses, technology developers and investors – to overcome the challenges facing both SEL and related education technologies. As we explore in Chapter 4, policy-makers in particular must stand at the forefront of setting the agenda for policy change, prioritizing efforts that foster SEL and related assessments and measurements in education, as well as providing funding and other resources for the research and adoption of SEL and related ed-tech. The development of standards and ratings processes should be a key priority. For their part, parents and educators play a vital role, working together closely to capitalize on what works in ed-tech for SEL at home and at school.

If stakeholders work together, particularly at the all-important stage of setting the policy agenda, they can change perceptions and behaviours about SEL. Together, stakeholders can establish enduring policies that fully incorporate SEL into a child's education and development.

Chapter 1: Benefits and best practices in SEL

SEL is intended not to supplant but to complement foundational academic skills such as literacy and numeracy, starting at the earliest stages of development and continuing through secondary schooling. Because of its wide-ranging impact, SEL has the potential to change how parents guide their children's development and how schools shape their curricula. In this chapter, we examine the numerous benefits of SEL and look at best practices in the development of social and emotional skills.

The benefits of SEL

SEL offers a host of benefits. Consider a classroom in which group work focuses not only on mastering academic material but also on how well students collaborate and communicate with one another. These skills are imperative for today's youngest generations, who require a wide-ranging set of social and emotional abilities to prepare them for the demands of a rapidly changing workplace, position them to achieve better academic outcomes and equip them to contribute to society.

Workplace benefits

The workplace is changing. In the US, the jobs that have grown the most consistently over the past two decades, as measured by wages and employment, are those that require both high cognitive skills and interpersonal skills. According to Professor David J. Deming of Harvard University, since 1980 the bulk of job growth in the US has been in occupations that require high social skills (see Exhibit 2). Given these trends, learning must be transformed in ways that will enable students to acquire the broad set of skills that will help them to thrive in a rapidly evolving, technology-saturated world.[2]

A projected 65% of children entering grade school will work in jobs that do not exist today[3], a transformation that will require social and emotional skills such as creativity, initiative and adaptability to navigate. Some economists argue that the emerging labour market will require workers to be able to solve unstructured problems, work with new information and carry out non-routine manual tasks.[4] That's true even for manual or administrative jobs, for which responsibilities now generally include much less routine labour and more digitized, nuanced communication.

Moreover, middle-class jobs increasingly will depend on a worker's ability to process and convey information.[5] To succeed at work, people must be able not only to analyse problems without the benefit of an instruction sheet but also to communicate their findings to others, across borders and time zones. Jobs of the future certainly will continue to require routine manual abilities. However, the résumés of successful candidates will need to include social and emotional proficiency.

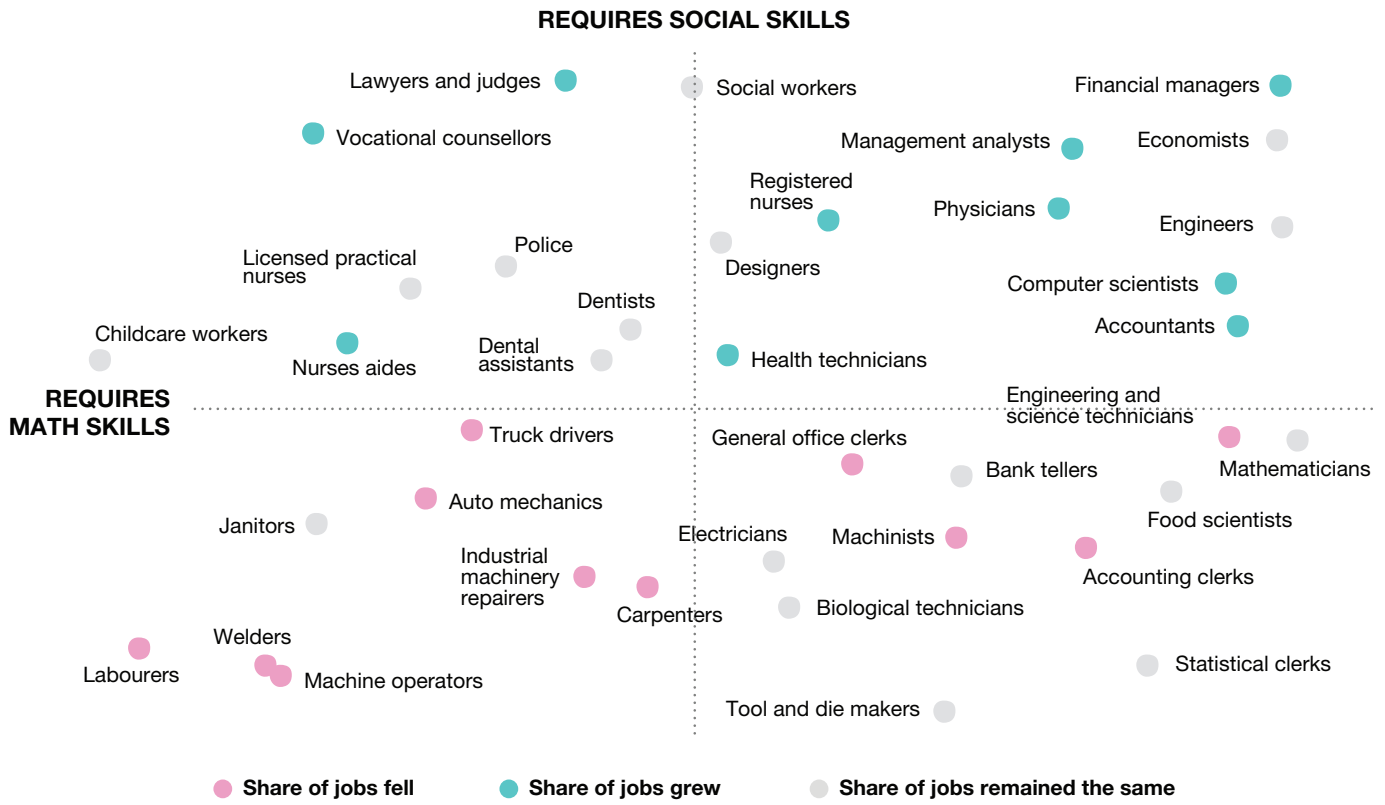
Some employers already recognize the benefits of social and emotional skills in the 21st-century workplace – including global internet giant Google. After examining employee surveys and performance reviews, Google found that its most effective managers were good coaches, took an active interest in their employees' lives and were skilled at listening to and sharing information. For example, as one manager said, when it came to communicating company updates, the most effective managers went beyond relaying information to explain what that information meant for their teams.[6]

Academic and other benefits

Studies have shown that social and emotional skills pay dividends in academic performance and other measures of well-being. In 2011, a meta-analysis of 213 studies involving more than 270,000 students from kindergarten through high school found that SEL could promote a host of academic, social and emotional benefits for students.[7] Students who received SEL instruction had achievement scores that averaged 11 percentile points higher than those who did not. Acquisition of social and emotional skills contributed to better academic performance and improved attitudes and behaviours. It also reduced emotional distress.

SEL has long-term effects during a person's lifetime as well. In the 1960s, the Perry Preschool Study examined the impact of social and emotional skills introduced early in a child's education.[8] The study exposed one group of young, at-risk students to a preschool curriculum that incorporated SEL; a control group of matched peers were taught using a traditional curriculum. The study then tracked those children until age 40. On average, those who had participated in the Perry curriculum had higher earnings, were more likely to be employed, had committed fewer crimes and were more likely to have completed high school than their counterparts who didn't have the preschool's SEL-oriented experience.[9] Similarly, a recent longitudinal analysis by the Organization for Economic Co-operation and Development (OECD) across nine countries showed that having a balanced set of cognitive and social and emotional skills is crucial for children to better face the challenges of the 21st century; social and emotional skills in particular play an important role in improving children's chances of lifetime success.[10]

Exhibit 2: Since 1980, jobs requiring social skills have surged



Note: The position of an occupation on the x and y axes reflects the intensity of math and social skills required, based on calculations by David Deming, using data from the Occupational Information Network (O*NET), a survey administered by the US Department of Labor. The bubble color reflects changes in the share of jobs from 1980 to 2012. Jobs with shares that changed in a range from -24 to 24 percentage points are grouped under "Share of jobs remained the same", jobs with shares that changed by more than 24 percentage points are grouped under "Share of jobs grew" and jobs with shares that changed by less than -24 percentage points are grouped under "Share of jobs fell".

Adapted from Miller, Claire Cain, "Why What You Learned in Preschool Is Crucial at Work", *The New York Times*, October 16, 2015, http://www.nytimes.com/2015/10/18/upshot/how-the-modern-workplace-has-become-more-like-preschool.html, based on data from Deming, David J., *The Growing Importance of Social Skills in the Labor Market*, Harvard University and NBER, August 2015, http://scholar.harvard.edu/files/ddeming/files/deming_socialskills_august2015.pdf.

In addition, SEL programmes almost universally demonstrate a strong return on investment (ROI) over long periods of time. In 2015, a cost-benefit analysis of SEL programmes by researchers at Columbia University determined that the programmes generated an average return of $11 per $1 invested.[11] This analysis was conducted across six discrete SEL programmes, all of which demonstrated a positive ROI. Other studies have used different methods to demonstrate high ROI overall.

Although the most rigorous scientific evidence on SEL benefits to date has focused primarily on developed countries such as the US, evidence of the benefits of SEL can be found around the world. For example, the International Rescue Committee piloted its flagship programme, the Healing Classrooms Initiative, in Afghanistan, Pakistan and several countries in sub-Saharan Africa before disseminating it in more than 20 conflict and post-conflict zones around the world. The programme trains teachers in learning strategies that promote positive socialization, academic development and psychosocial well-being, including child-centred and active learning methods. Teachers trained in the programme realized considerable progress in both academic achievement and social benefits for students whose schooling had been interrupted by conflict.[12]

Perceptions of the benefits of SEL

Our five-country survey of more than 2,000 educators and parents revealed broad agreement about the importance of SEL but less agreement about its benefits. More than 90% of parents and teachers in China emphasize teaching children these skills, for example, and in the US, 81% of parents and 78% of teachers emphasize SEL. However, this reported agreement has not translated into a deep understanding of the complete set of benefits that social and emotional skills can deliver, in those countries and elsewhere.

Parents and educators across the world primarily see SEL as a means of achieving better classroom discipline today, not as a way to ensure better academic and economic outcomes over the long term. Between a half and three-quarters of teachers across the five countries surveyed listed better discipline as one of the primary benefits of SEL, for instance, whereas fewer than half cited improved academic performance as a main benefit. Parents and teachers in China and South Korea cited an individual's well-being and happiness as a benefit of SEL more frequently relative to academic-, college- and career-related benefits. For instance, in South Korea, 85% of parents and 70% of teachers identified the higher likelihood of being happy as an adult as a key long-term benefit of SEL and only 11% and 22%, respectively, listed better chances of graduating from high school as a benefit of SEL. (See Chapter 3 for additional survey findings.)

Best practices in SEL

Research suggests that early childhood is a critical period for fostering SEL. Children are at their most receptive to SEL and strategies targeting this stage are most likely to have a lasting impact. But research also indicates that SEL at later stages is necessary and effective and offers opportunities to attain skills. In other words, social and emotional skills are teachable at all ages.

On that basis, we believe that SEL is highly effective when developed through direct instruction in a child's early years and when embedded in the core curriculum as students progress through elementary and secondary schooling. We have identified a host of best-practice learning strategies for instilling social and emotional skills. But SEL should not be considered a classroom tool alone; it can take place in many effective settings, both inside and outside the classroom.

Best-practice learning strategies

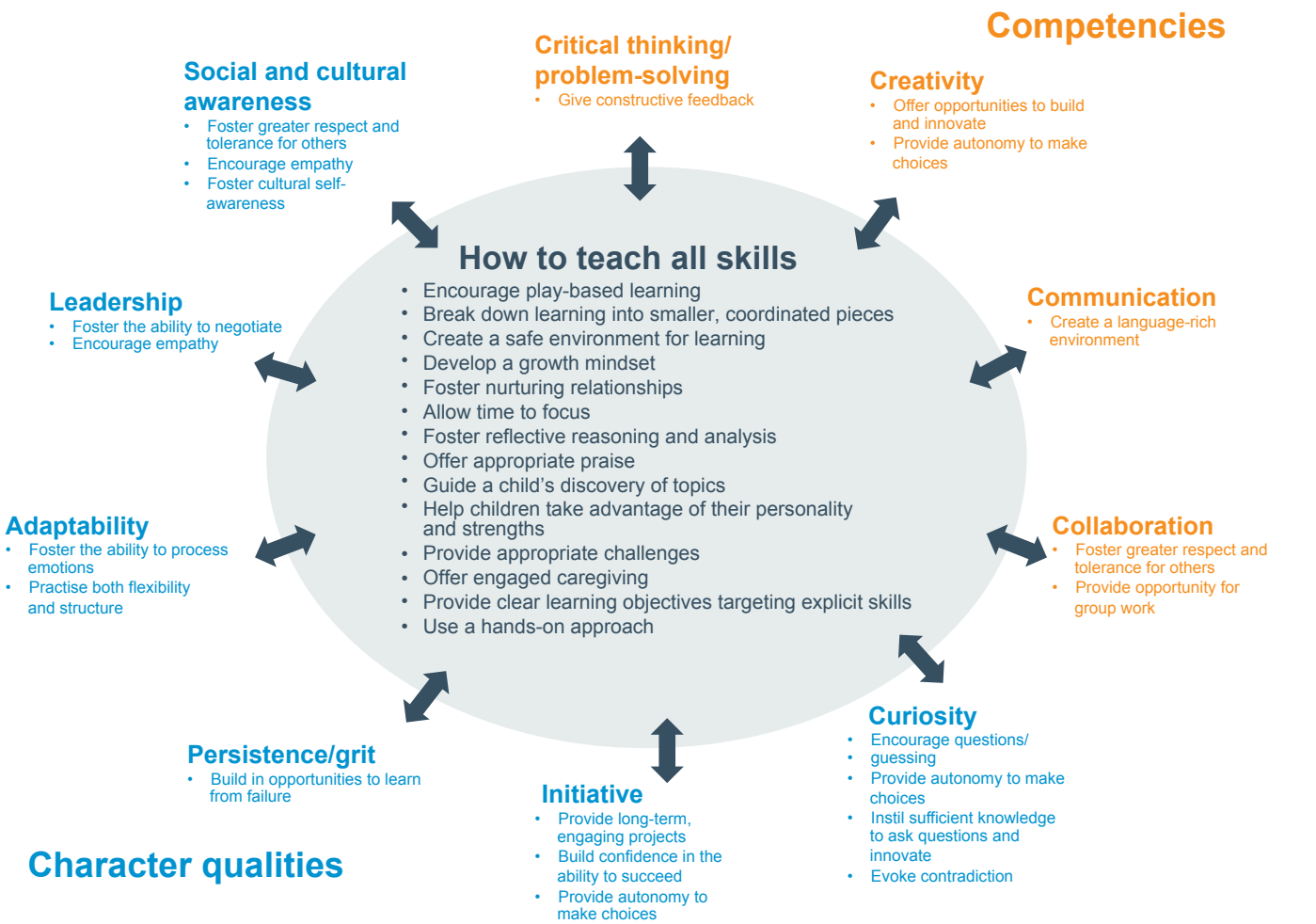
Through our research into successful non-technology-based SEL approaches, we have identified 30 best-practice learning strategies to develop the competencies and character qualities that define SEL. These include 14 strategies that create an environment conducive to developing social and emotional skills in general and 16 targeted strategies that are specific to the development of individual social and emotional skills (see Exhibit 3 and Appendix 1).

The first set of learning strategies works to develop all social and emotional skills at once. Examples of these strategies include creating a safe environment, developing nurturing relationships and allowing for open-ended time to play freely and creatively. For example, play-based learning provides unscheduled time to explore without restrictions, rules or pressure – a central component of a creative and active learning process.

Another general learning strategy that develops a range of social and emotional skills involves fostering a "growth mindset", a phrase coined by Carol Dweck, Professor of Psychology at Stanford University. When people have a "fixed mindset" they believe that basic qualities like intelligence and talent are fixed traits that govern what children can do. A growth mindset, in contrast, holds that the brain works like a muscle – it gets stronger with practice and hard work. Dweck's research suggests that fostering a growth mindset can improve academic performance. Teaching a growth mindset motivates students and makes them more productive – and can create a classroom where students are encouraged to take on challenges, try new things and learn from their mistakes.

The second set of learning strategies works to develop specific social and emotional skills. One example is to develop leadership by fostering the ability to negotiate and empathize. Another strategy might target creativity by providing a child with the autonomy to create something on his or her own. Although creativity is a complex, multidimensional skill that is difficult to measure and define, studies show commonalities in

Exhibit 3: A variety of general and targeted learning strategies foster social and emotional skills



successful approaches: allowing students to have ownership and control over the process of creating and producing an innovative idea, for example, and helping students develop a tolerance for ambiguity.[13]

Fostering collaboration is another example of a targeted strategy: in this case, key methods include building empathy and tolerance for others and working in groups. For instance, collaboration is particularly effective when it requires students to solve problems and work effectively with others, communicate with a group and manage resources (such as time) to achieve a shared goal.[14] Research has indicated that collaboration improves students' sense of community and even leads to better academic outcomes, such as the ability to think critically and to learn through self-reflection.[15]

SEL inside the classroom

At school, social and emotional skills are typically developed through three primary approaches: a dedicated SEL curriculum, social and emotional skill development embedded in an existing academic curriculum and teaching practices such as project- or inquiry-based learning.

A dedicated SEL curriculum teaches the specific skills and vocabulary that students need to master and use. For example, Lions Quest, a preschool through secondary-school programme run by the Lions Club International Foundation in more than 90 countries, focuses on social and emotional skills such as collaboration and communication to develop positive behaviour, character and service learning. To foster these skills, Lions Quest includes a diverse set of instructional practices, including cooperative group work, discussions, peer-to-peer teaching, problem-solving and group reflection. Lions Quest's "think-pair-share" practice encourages students first to think about a problem or question alone, then pairs them with other students to discuss and finally has the paired groups summarize their discussions for the class. These kinds of strategies require dedicated time in the academic schedule.

Educators can also embed the content and vocabulary of SEL into academic programmes focusing on foundational skills. For instance, the Facing History and Ourselves programme combines lessons and activities about identity and community with traditional history instruction, fostering dialogue, empathy and reflection. Another example is EL Education, a programme that offers an open-source English language arts curriculum that focuses on building cultural sensitivity, creativity and collaboration. The programme allows students to choose among writing topics and encourages discussion, debate and reflection. It includes visits to museums and the outdoors, and it lets students shape their own projects.

Another strategy for developing SEL at school is through specific teaching practices, such as project-based learning, inquiry-based learning and classroom discussions. These teaching practices require students to work in groups and use social and emotional skills as they discuss a topic, listen to one another solve a problem or make choices about their own learning. The Buck Institute for Education's model of project-based learning, for example, helps teachers make learning highly engaging and developmentally appropriate for secondary-school students. Its programmes focus on group projects, in which students collaborate to meet deadlines, present information, think critically, use technology and solve problems.

SEL outside the classroom

School is not the exclusive domain of SEL. Skills can and should also be taught at home, particularly to younger children. Parents and educators have complementary roles, and programmes that encourage and enable communication between parents and educators provide consistency and continuity to a child's skill development. To play their part, parents must have the same social and emotional knowledge and skills that teachers require to make SEL more effective. In general, the children of parents and caregivers who are knowledgeable about and engaged in their child's education have higher test scores, better grades, higher attendance and course-completion rates, greater enrolment in more challenging academic programmes and improved behaviour and social skills.[16]

SEL programmes for parents can be categorized as direct or holistic; both types aim to enhance a parent's ability to provide a safe and nurturing environment for his or her children. Direct interventions teach parents the techniques and skills to foster SEL in their children, through programmes such as Incredible Years, which helps improve parenting skills by reinforcing positive behaviours and developing a better relationship between parent and child. Parents are taught to model, support and encourage specific social skills. Holistic programmes help parents become more effective by addressing a range of issues that affect a family. One such programme is the Nurse-Family Partnership, which uses home visits by nurses (during pregnancy and infancy) to help parents make decisions about healthcare, early childhood care and learning opportunities. (See sidebar, Programmes that foster SEL.)

Involvement in extracurricular activities – for example, sports, music and Boy and Girl Scouts – can also foster SEL. Many such programmes have demonstrated the ability to teach children skills including problem-solving, teamwork and resilience.[17] After-school activities also can serve as a bridge or "border zone" between the culture of the school environment and peers, families and communities.[18]

Social and emotional proficiency yields numerous and wide-ranging benefits – in classrooms and workplaces and across society. Students can learn social and emotional skills through a combination of learning strategies and in a variety of settings, including at school, in the home and in the community.

Programmes that foster SEL

From pairing students of different ages together to fostering parent discussion groups, a number of approaches have emerged to instil social and emotional skills in students. The following well-respected, broad-based efforts are examples of programmes that embed SEL within core academic subjects or create standalone lessons focused on teaching SEL directly. Most of these programmes are US-based examples that have passed rigorous checkpoints to be part of the list of effective programmes set by CASEL. The lone exception is the Nurse-Family Partnership, which we have included given evidence of its lasting and positive impact. A few of these efforts have been replicated in other countries, though more needs to be done to promote the global adoption of SEL.

Parenting programmes

Al's Caring Pals provides home-based childcare providers with training and materials that develop social skills and healthy decision-making in children aged three to eight years old. It uses puppets, role-playing and music to teach problem-solving and positive behaviour. With tools such as a songbook and posters, children in the programme begin to learn how to share, accept differences and resolve conflicts peacefully under the guidance of childcare providers.

Al's Caring Pals aims to promote resilience in early childhood with explicit instruction to develop social competence, autonomy and problem-solving. Generally, findings indicate that the programme strengthens social and life skills, prevents increased aggressive or antisocial behaviour that might otherwise occur, guides children to differentiate between safe and harmful substances and situations, and helps children manage their own behaviour, freeing teachers to do more teaching.

In **The Incredible Years**, discussion groups and practice interventions with other parents are key components of the SEL programme. It includes a set of complementary and comprehensive group-training programmes for parents, children and teachers, emphasizing for parents training on age-appropriate skills known to promote children's social competence, emotional regulation and academic skills and to reduce behavioural problems. In this direct parenting intervention, group leaders include social workers, psychologists and physicians. Several studies have demonstrated the programme's effectiveness in increasing positive social behaviour, reducing conduct problems and improving social and emotional skill performance.

Interventions begin before a child is born in the **Nurse-Family Partnership** (NFP). In this programme, one-on-one home visits start at pregnancy and continue through year two. Certified nurses facilitate the programme, which aims to improve qualities such as warmth and empathy. The NFP has been tested widely, including separate randomized controlled trials conducted over more than three decades. Findings show that the programme produced sizeable, sustained effects on important outcomes, such as improved prenatal health and school readiness.

School programmes

Social and emotional skill development is embedded in the academic curriculum in the **4Rs Program** – reading, writing, respect and resolution. It focuses on language arts for pre-kindergarten through eighth grade and includes reading aloud and discussion about books. Lessons cover managing feelings, assertiveness and empathy, among other social and emotional skills. The programme typically spans an entire school year and requires 25 to 30 hours of teacher training. 4Rs has been evaluated in a large randomized control trial that followed more than 1,100 students over a three-year period and demonstrated improved social behaviour and reductions in conduct problems and emotional distress.

An example of a dedicated SEL curriculum, **PATHS Education Worldwide** is a school-based programme in which students receive a 20- to 30-minute SEL lesson several times a week. Puppets, posters and other visual materials are used to cover self-control, emotional awareness and problem-solving skills. A primary objective of the PATHS curriculum is to apply these skills to address behavioural and emotional issues and promote peaceful conflict resolution, emotion regulation, empathy and responsible decision-making. PATHS has been rigorously and extensively evaluated and shown to lead to improved academic performance and increased positive social behaviour, among other positive outcomes.

Finally, an example of a targeted teaching practice, one that relies on community building and school-wide connections, is the **Caring School Community** programme from the Center for the Collaborative Classroom. In this effort, students use class meetings for team-building, norm-setting, decision-making and reflection. Students also pair up with "buddies" of different ages. In one activity, older students might take their younger peers on a tour of the school library. The programme aims to model expectations for behaviour and help students build social skills. The Caring School Community has been evaluated in multiple studies that show positive outcomes, mainly improved academic performance and social behaviour.

Chapter 2: The promise of education technology

Technology holds enormous promise to help foster 21st-century skills, including social and emotional skills. It can personalize learning, engage the disengaged, complement what happens in the classroom, extend education outside the classroom and provide access to learning to students who otherwise might not have sufficient educational opportunities.

To date, however, most of the learning strategies commonly used to develop social and emotional skills (see Chapter 1) do not use technology or use it in only a limited way, for several reasons.

Many parents and educators do not fully understand which technologies hold the most promise for developing social and emotional skills or how best to use those technologies, even though educators in all the countries we surveyed showed relatively high awareness of the use of ed-tech to foster SEL in general (see Chapter 3). For example, teachers use computers, interactive whiteboards and other technologies to make classtime more productive, such as by managing schedules and lessons, much more than they use them for SEL, such as by fostering student's creativity through multimedia projects. Outside the classroom, the use of technology for SEL is low too, even though our survey reveals that the perceived value is relatively high. A significant gap exists between the percentage of teachers and parents who believe technology is effective for developing social and emotional skills and the percentage who are actually using it for SEL.

In addition, the number of SEL products in the ed-tech market today is insufficient. Most currently available ed-tech products focus on foundational skills, such as literacy and numeracy, not on the SEL-related competencies and character qualities we identified in the earlier report, *New Vision for Education: Unlocking the Potential of Technology.* Based on this existing emphasis on traditional-skill development, only a small fraction of investments in ed-tech have targeted companies that include SEL in their products.

Despite these challenges, we have identified three key opportunities to use education technology to expand the teaching of social and emotional skills and maximize its impact:

- **Capitalize on what works.** Educators and parents don't have to start from scratch when developing social and emotional skills. They can use ed-tech products that demonstrate the potential to foster SEL.
- **Embed SEL into foundational ed-tech products.** Developers of ed-tech products can include features that focus simultaneously on foundational academic subjects (such as language arts and mathematics) and social and emotional skills (such as collaboration and communication) as they work on new iterations of products.
- **Expand the realm of the possible.** Several leading-edge technologies for learning and entertainment open up uncharted opportunities for SEL. Wearable devices, apps and virtual reality are among the innovations that can help students manage their emotions, build collaboration skills and gain greater empathy for others.

Capitalize on what works

We see great potential for improving specific social and emotional skills using select existing products in the $43 billion global ed-tech market.[19] Consider digital games. They incorporate play, which researchers have shown is important to healthy childhood development. They provide opportunities for continued practice. And they can be personalized for students' individual needs. Our research has identified three types of games that have strong potential to help develop social and emotional skills: role-playing, strategy and sandbox games.

Role-playing games portray sequences of events that create a narrative arc. Players have a variety of options for interacting within the game through their characters and can take multiple paths, or double back and revisit times or places they have previously explored. ICivics, a web-based learning platform from a non-profit organization founded by former US Supreme Court Justice Sandra Day O'Connor, is designed to teach civics and inspire students to be active participants in US democracy. ICivics includes role-playing games that simulate such things as being "president for a day" and arguing a case before the Supreme Court. In an evaluation of persuasive-writing skills, Tufts University researchers found SEL potential in iCivics' argumentative-writing tool, Drafting Board. In addition to teaching students how to conduct research and compose complex arguments on civics topics, Drafting Board addresses "deeper learning competencies such as complex communication, problem solving, and self-directed learning skills," the Tufts researchers found.[20]

Strategy games involve multiple players in a quest to manage the planning and strategic deployment of scarce resources. One example is Sid Meiers' Civilization V, in which players strive to become "ruler of the world" by establishing and leading a civilization from prehistoric times into the space age. Players make strategic decisions regarding diplomacy, expansion, economic development, technology, government and military conquest. Studies have shown that players mastered important historical facts, but more important, they took away a deep understanding of the intricate relationships among the geographical, historical and economic systems that shape civilizations.[21]

Sandbox games focus on open-ended exploration. Minecraft, for example, incorporates several strategies for building SEL. The game sparks creativity as players "craft" a 3D world using blocks of wood, ore, stone and other materials. Minecraft can be a collaborative multiplayer game, in which students work together to achieve a shared goal. Success in the game hinges on being resourceful and taking the initiative to secure essential elements. Constance Steinkuehler, a researcher at the University of Wisconsin-Madison, identified improvements in academic subjects such as reading, biology, ecology and physics linked to games like Minecraft.[22] As for promoting social and emotional skills, numerous published case studies from primary- and secondary-school classrooms that have integrated Minecraft into the curriculum bolster the company's claim that the game fosters creativity, collaboration and problem-solving.[23]

To identify ed-tech products that have the potential to help develop social and emotional skills, we have assembled a list of research-based product features that are highly correlated with our set of 10 competencies and character qualities (see Exhibit 4). Of course, not every ed-tech product with these features will automatically foster SEL, and those that do will promote it to varying degrees, so thoughtful integration of these tools into SEL efforts is critical. Further, research shows that it may be difficult to transfer some skills outside a digital-game environment unless the game is coupled with effective pedagogy.[24] "Debriefing" is critical to using games in education because it helps to cement the connection between learning in the game and applying those same skills to other contexts.[25] Teachers can facilitate the transfer of skills by leading pre- and post-game discussions that tie the game to other classroom lessons.

Our list includes 55 features. For instance, if the objective is to boost a student's creativity (an SEL-related competency), our research into the academic literature and interviews with experts suggest that an ed-tech game would be appropriate if it creates complementary roles for different players, encourages role-playing and perspective shifting and facilitates offline group activity and quests. Requiring players to work together towards common goals to progress in a game can nurture leadership and communication. Players can also learn negotiation skills as they exchange virtual goods while playing, which can build leadership and social and cultural awareness. A game that allows players to debrief and reflect on their performance can help with critical thinking; in a session after the game, players and a facilitator talk about the experiences and outcomes of the games.

Of the 55 features, 21 address all social and emotional skills. We categorize these features into three broad groups:

- **Structure of interactions:** for example, features that allow play over multiple sessions or that allow for turn-taking.
- **Elements of play:** for example, features that make play adaptive to performance or reveal hidden information through a player's actions.
- **Assessment and reinforcement:** for example, aids for teachers and parents or stealth assessment.

The other features are geared towards specific social and emotional skills (see Appendix 2 for more details).

Exhibit 4: Parents and educators need a list of ed-tech features linked to SEL

Features addressing all skills

Structure of interactions
- Allow for turn-taking
- Allow play over multiple sessions with breaks
- Allow verbal and non-verbal responses
- Create safe environments to explore and experiment
- Enable game customization and modification
- Include engaging characters
- Include virtual characters that are able to interact with players (embodied conversational agents)

Elements of play
- Allow for management of complex systems
- Encourage players to apply knowledge learned in games (action domain link)
- Facilitate resource management
- Increase difficulty level as play progresses
- Make play adaptive to performance
- Offer non-linear narratives
- Provide direct SEL skill instruction
- Reveal hidden information through players' actions

Assessment and reinforcement
- Allow for writing notes and journal entries
- Encourage players to narrate plans and actions taken in game
- Include aids for teachers and parents
- Include stealth assessment
- Offer immediate feedback about performance
- Offer meta-cognition strategies

Critical thinking/problem-solving
- Allow players to share proposals
- Allow players to debrief and reflect on their performance
- Offer help, hints and instructional supports
- Connect game to players' interests
- Award players with prizes
- Allow for open-ended exploration
- Embed subject-matter tutoring

Creativity
- Create complementary roles for different players
- Offer augmented reality and simulation
- Embed fantasy-like themes
- Encourage role-playing and perspective shifting
- Facilitate offline group activity and quests
- Combine multiple parts of game into a new form
- Offer opportunities to make choices
- Create characters and build virtual products

Communication
- Create complementary roles for different players
- Build in written ways to communicate
- Encourage interaction with other players
- Allow communication over social media
- Allow for voice communication
- Allow players to share proposals

Collaboration
- Create complementary roles
- Build in written ways to communicate
- Encourage interaction
- Offer incentives to mentor other players
- Encourage work with others towards common goals
- Allow multiple players
- Allow communication over social media
- Allow for voice communication
- Facilitate offline group activity and quests
- Allow players to share proposals

Curiosity
- Facilitate offline group activity and quests
- Combine multiple parts of game into a new form
- Offer opportunities to make choices
- Allow for open-ended exploration
- Embed subject-matter tutoring
- Make uncertainty salient
- Reward partial steps
- Create characters and build virtual products
- Provide multisensory learning materials
- Provide puzzles that are solvable with effort
- Reward guessing with feedback on correct answers

Persistence/grit
- Award players with prizes
- Feature conflict or competition with others
- Feature rankings and leader boards

Initiative
- Facilitate offline group activity and quests
- Combine multiple parts of game into a new form
- Offer opportunities to make choices
- Create characters and build virtual products
- Encourage the completion of goals
- Provide long-form play
- Manage multiple goals
- Allow practice without penalty

Adaptability
- Allow practice without penalty
- Create characters and build virtual products
- Encourage negotiation through the exchange of virtual goods
- Encourage role-playing and perspective shifting
- Manage multiple goals

Leadership
- Offer incentives to mentor other players
- Encourage work with others towards common goals
- Encourage negotiation through the exchange of virtual goods

Social and cultural awareness
- Offer incentives to mentor other players
- Encourage work with others towards common goals
- Allow communication over social media
- Encourage negotiation through the exchange of virtual goods

The list of features has a broad spectrum of potential applications. In our interviews with parents, educators, investors, technology developers and others, we uncovered a clear opportunity to develop one such application: SEL standards. These standards could serve as the basis for a range of new and enhanced ratings, reviews and other ways to guide parents and educators to the products that truly develop social and emotional skills. They could form the basis of a "seal of approval" for a product that fosters SEL. *Instruct,* a newsletter published by EdSurge that has endorsed a handful of ed-tech products suitable to help educators teach social and emotional skills, is one existing example of useful standards. In another example, a new effort, the Global Educator Institute's GEI Seal of Endorsement, recommends specific products for use in classrooms.

A set of standards could also feed into existing rating systems, such as the ratings that the Entertainment Software Rating Board provides for video and computer games, which include information on content so that parents can make informed purchasing decisions. Standards could even be extended to a product's applicability for particular ages and developmental stages, much as the non-profit organization Common Sense Media does with its reviews of movies, TV shows, games, apps, music, books and websites in terms of profanity, positive messages, positive role models and age appropriateness. Our list of features could also inform the in-depth reviews already offered for ed-tech, such as the list of SEL-related skills that Common Sense Media uses to rate the learning potential of games.

All of these potential applications could help parents and educators identify ed-tech products that support social and emotional skills and guide developers and technology developers towards SEL features that they should consider embedding into new and existing ed-tech products.

Embed SEL into foundational ed-tech products

As we have shown, many games already have features that promote the development of social and emotional skills. An even greater opportunity emerged from our research and discussions with ed-tech investors: embedding SEL content into existing academically oriented ed-tech products that foster foundational skills.

Our survey of the ed-tech investment landscape revealed that the bulk of the financing for products targeting primary and secondary students has gone to multimedia, standards-based content delivery and online courses and tutoring. Only 5% of all ed-tech funding from 2011 through 2015 flowed to companies creating products directly or tangentially involved in SEL. (See sidebar, The investment landscape for education technology.)

However, venture capitalists told us that they are more interested in funding developers that can embed SEL features into products focused on core academic subjects than in funding SEL-only ed-tech developers. Their strong interest, along with the fact that 95% of ed-tech funding is currently flowing to ed-tech products that are not specifically focused on SEL, signals to us a large potential "white space" of opportunity for developers that want to embed features that already work in SEL into other realms.

A graphical representation of the $5 billion in private investment flowing into preschool-to-secondary-school education technology from 2011 through 2015 displays a network of interconnected companies (see Exhibit 5). Some clusters of companies offer closely related products or services. The largest and densest clusters of lines in the network indicate sectors receiving relatively high levels of investment, such as within multimedia products, online courses and academic programmes. Within this network, we observe only limited investment in companies whose products or services are directly or indirectly related to SEL (see the magnification of the network at right in the exhibit), as represented by the relatively sparse number of lines showing companies offering SEL-related products or services. This network map highlights an opportunity to embed SEL into existing products where investors' money and interest are growing and where the level of interconnection is highest, such as within online courses and tutoring and academic standards-based and Common Core programmes.

Our research into the ed-tech space uncovered several existing products whose developers have successfully layered one or more SEL features into foundational academic products targeting specific skills. We encourage other ed-tech developers to follow their example and tap into this significant area of opportunity.

One product that embeds a range of general strategies for developing all 10 of the social and emotional skills we have identified is the Web-based Inquiry Science Environment (WISE). The free online platform offers customizable curricula and activities for students in grades 6-8 in a number of languages. It enables students to conduct science experiments, practise using the scientific method and collaborate to explore standards-aligned science concepts. Teachers guide and evaluate the process through a suite of classroom tools.

The highly interactive, visually rich platform builds science skills and deepens understanding of science concepts while embedding several social and emotional skills. Students work on customizable projects together in groups and develop presentations to test and refine their scientific arguments, ponder events that don't fit their theories and write reflections. All of these activities foster collaboration, communication, leadership and critical thinking and problem-solving skills. The web-based platform also encourages students to self-monitor their progress and solidify their understanding of topics before moving on, which helps them take the initiative to direct their own learning as they work individually and to cultivate adaptability in the face of potential failure. And the hands-on, inquiry-based curriculum gives students the chance to explore new ideas, stoking creativity, curiosity and adaptability. Several studies have documented the effectiveness of the WISE programme in improving science learning and integrating what students learn.[26]

ThinkCERCA embeds targeted SEL strategies to teach critical thinking while also building foundational skills in literacy, science and social studies. CERCA stands for Claim, Evidence, Reasoning, Counterarguments and Audience. The multidisciplinary framework – used by districts in Chicago, New York City, Oakland and Milwaukee – offers students rounds of feedback as they construct and refine effective arguments. They learn to make a claim, support it with evidence, explain their reasoning, address counter-arguments and tailor their argument to their audience. As they do, they take notes, annotate written work and direct questions to a group, thus refining their reading, writing and collaboration skills.

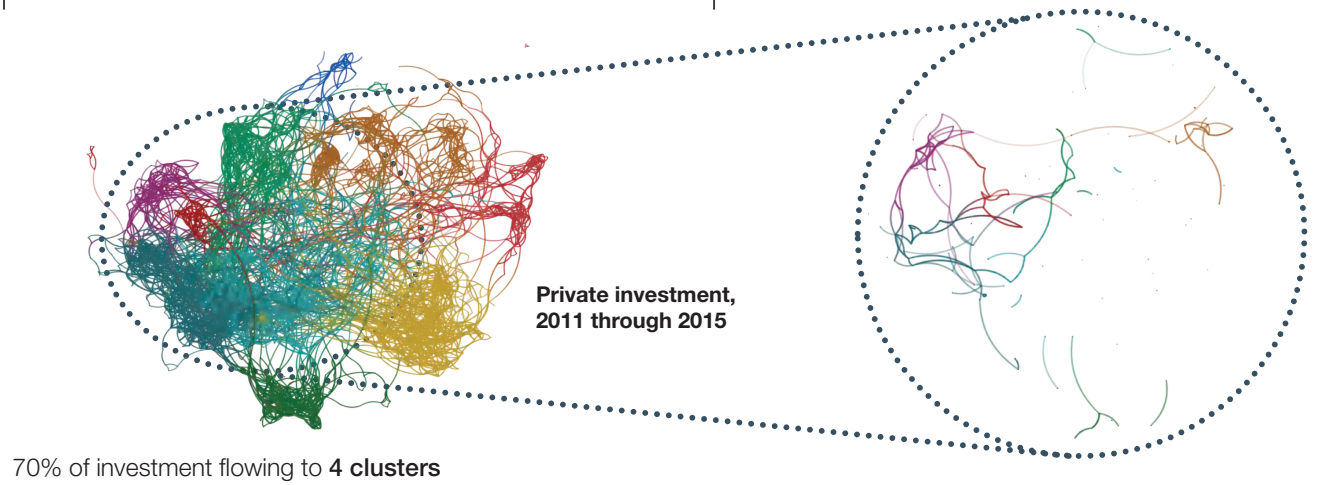
Exhibit 5: Embedding SEL into existing academic products represents a significant opportunity

About $5 billion in investment has flowed to preschool through secondary school ed-tech companies since 2011

Large areas of dense same-colour clusters indicate areas receiving relatively high investment, mainly online courses and tutoring, multimedia content delivery and platforms, academic-standards-based programmes and foreign language and literacy products

But only 8% of companies have directly or indirectly targeted SEL for preschool through secondary school

Magnification of the area of the network representing companies that have directly or indirectly targeted SEL reveals limited investment but suggests an opportunity to incorporate SEL in the areas with high levels of ed-tech investment but low levels of SEL adoption



70% of investment flowing to **4 clusters**

- Multimedia content delivery and platforms
- Online courses and tutoring
- Providers and distributors of curricula and educational materials
- Systems management, security and infrastructure
- Blended learning and learning management systems
- Foreign language and literacy products
- Academic-standards-based and Common Core programmes
- Special needs tools
- Games
- Adaptive curricula and machine learning

Note: Data about education technology investments was obtained using specific keywords and filters in the Quid software tool to identify the ed-tech space.
Source: Capital IQ and company websites.

Expand the realm of the possible

A third promising area of opportunity taps into leading-edge technologies to help students develop social and emotional skills in new ways. Five innovative technologies warrant special attention:

- Wearable devices
- Leading-edge apps
- Virtual reality
- Advanced analytics and machine learning
- Affective computing

These nascent technologies include features that embrace and extend tried-and-true ways of fostering SEL and also offer potential for exciting new learning strategies. Some early offerings, however, hold strong promise for advancing SEL and ushering in a new era of tech-enhanced learning.

Wearable devices

Wearable devices include wristbands, smart watches, headsets and smart clothing. In the consumer and healthcare markets, popular products include wristbands for fitness and activity tracking and smart watches offering a range of apps. As biometric sensors evolve, wearables are increasingly able to track physical responses, such as fluctuations in stress and emotion.

Within SEL, wearables are already being used to help students manage their emotions and build communication skills. For example, Starling, by VersaMe, is a small wearable device designed to improve communications in early childhood. It tracks the number of "child-directed" words that a child hears each day to support language development and improve educational outcomes. An accompanying app helps caregivers set goals and meet challenges, such as achieving a certain amount of engaging conversation per day. Caregivers can check the app to monitor whether they are successfully helping children reach their full social and emotional potential.

Wearable devices can also provide a minute-by-minute record of someone's emotional state, potentially helping to build self-awareness and even empathy, both of which are critical components of social and emotional skills. The Embrace watch, from Empatica, is a wearable device that tracks physiological stress and activity. It can be programmed to vibrate when stress reaches a specific level, giving someone time to switch to a more positive response before stress gets out of control. Combining the functionality of the Embrace watch with coaching from parents and teachers may further enhance opportunities to build a child's social and emotional intelligence.

Leading-edge apps

Leading-edge apps for smartphones and tablets use the power of cloud computing and 3D video and sound-capturing capabilities to transform the user experience. They show potential to influence social and emotional skills such as creativity and curiosity.

Kidaptive's Learner Mosaic is one example. It is designed to provide parents with personalized insights into how well their children are progressing towards behaviour and activity goals. The app collects data and surfaces insights into a child's activity within another Kidaptive application, Leo's Pad, an iPad app for preschoolers that features a series of learning games and puzzles. Learner Mosaic shows how a child is developing in more than 75 skill areas,

both foundational (for example, counting) and social and emotional (creativity, for instance). It recommends specific actions that parents can take to help their child progress from his or her current level in a particular skill area.

Another example is Bloxels, from Pixel Press. With Bloxels, the maker movement (which melds do-it-yourself techniques with technology, design, art and creation) goes to school. This mobile video-game-design platform helps children design characters, environments and challenges and then assemble them into online games that they can play with friends. The classroom kit comes equipped with 10 to 20 virtual game boards on which students can work in teams or individually, placing coloured blocks to create designs that are assembled into a game in which characters walk, run and jump. Each colour represents a different element, such as red for fire, yellow for coins and green for ground. Students can also refine and post completed games on an online exchange. Bloxels has been shown to build critical thinking, persistence and adaptability skills by allowing students to experiment and test their ideas in a marketplace, motivating them to improve on their game with a built-in reward system.

Virtual reality

Virtual reality (VR), which initially gained popularity among gamers, has evolved into a more affordable, mobile format. Schools are using VR equipment such as headsets to simulate physical presence in an immersive digital environment. The goals are to forge stronger links to real life, foster greater self-awareness and spur creativity – without the high cost and time required for travel.

EON Reality, for example, enables interactive 3D learning through VR tools for collaboration and virtual learning. Some schools already use devices such as these, showing potential to bolster social and emotional skill development, including fostering greater cultural awareness and curiosity through virtual field trips. The VR sector is poised for mainstream adoption: start-ups have multiplied, venture capital funding has poured in and mass-market products such as the Rift headset from Oculus VR, owned by Facebook, are beginning to hit the market.[27]

An effective way to increase engagement, build curiosity and improve critical thinking is to take students on field trips.[28] Google is reinventing the traditional field trip with two products that, in combination, yield an affordable, accessible virtual field-trip experience for students around the globe. Google Cardboard is a virtual-reality and augmented-reality platform that generates immersive experiences through a home-made mount for a mobile phone that can be created with simple, low-cost materials such as cardboard, Velcro and rubber bands. The Expeditions Pioneer Program, part of Google for Education, gives students access to a similar immersive VR experience, curated by a teacher with a tablet, in exotic locales such as the Great Barrier Reef, Machu Picchu and a NASA space station.

Advanced analytics and machine learning

For years, advanced analytics and machine learning have been employed in the private sector to deliver business insight. Increasingly, these applications are entering education. Advanced analytics and machine learning hold significant potential for social and emotional learning because they allow educators to personalize instruction through predictive computing.

One example is Civitas Learning, whose apps use predictive analytics to improve learning, persistence and attendance and graduation rates. The Civitas algorithms identify data signals that correlate to a student's success – such as those indicating preparation, participation and attendance – and provide a dashboard that educators can use to assess performance.

And ZooU, an online game by Personal Learning Games, assesses three of our 10 character and competencies skills – communication, collaboration and social and cultural awareness – with additional emphasis on impulse control, empathy and emotional regulation. As each student progresses through modules, the game analyses data about his or her choices, mouse clicks and required time to complete a task. ZooU tailors the experience to a child's needs and performance to provide personalized learning. The game also provides a scorecard to facilitate a teacher's understanding of each child's detailed SEL performance. ZooU's analytics can determine, with potentially increasing accuracy, a child's baseline social and emotional skill level and target skills that need development.

Affective computing

Affective computing comprises an emerging set of innovations that allow systems to recognize, interpret and simulate human emotions. While current applications mainly focus on capturing and analysing emotional reactions to improve the efficiency and effectiveness of product or media testing, this technology holds great promise for developing social and emotional skills such as greater empathy, improved self-awareness and stronger relationships.

Affectiva's Affdex is one specific high-potential example. This product uses a webcam and algorithms to capture, identify and analyse human emotions and reactions to external stimuli. Using eye-tracking data, Affdex compares a user's expressions with a database of more than 1 billion facial expressions to assess differences by nationality, age, gender and other characteristics. It can also differentiate between emotions such as happiness, fear, surprise and confusion.

Led by Dr. Justine Cassell, researchers from the ArticuLab at Carnegie Mellon University study how people communicate with and through technology. Their research uses virtual peers, also known as "embodied conversational agents", to study human interaction and teach social skills. The lab's latest project, Sensing Curiosity in Play and Responding (SCIPR), takes advantage of a diverse set of technologies to foster curiosity, exploration and self-efficacy, each of which is critical for developing scientific inquiry skills, confidence and intrinsic interest in learning. SCIPR aims to improve how elementary and middle school students learn about science by increasing and sustaining curiosity rather than simply delivering concepts or "teaching to the test". The researchers will develop interactive learning environments that show how artificial intelligence and multimodal social computing could help improve cognitive, social and emotional skills.

In identifiable and measurable ways, technology is proving beneficial to a child's development of social and emotional skills. Stakeholders can promote strategies that work through standards for products that develop social and emotional skills. Developers can embed SEL into traditional academic ed-tech products and reach large untapped markets. And developers can push the boundaries by integrating SEL into products at the forefront of technology. As they do, they are taking action to spread, reinforce and advance SEL.

The investment landscape for education technology

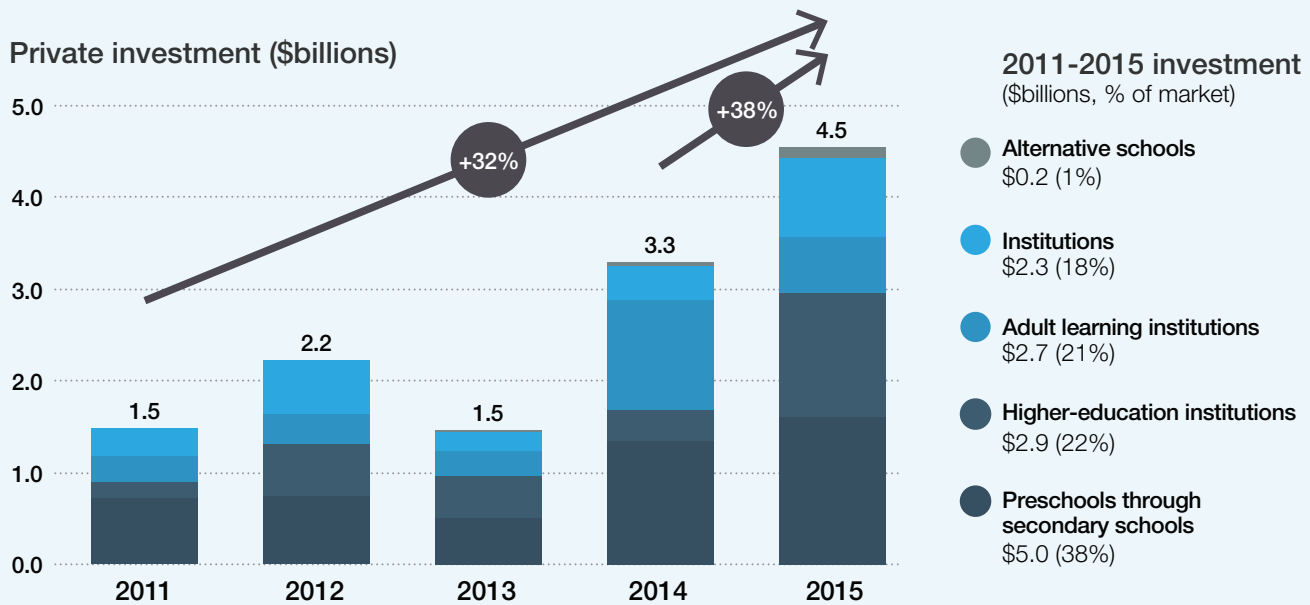
Education technology – from mobile apps for preschoolers to online courses for adults – has drawn increased interest from investors in recent years, although the total investment in the space represents only a small fraction of overall venture capital investments.

Across the globe, private investment in ed-tech has expanded, broadening opportunities to reach vast new communities of learners. Our research shows that since 2011, private investment in ed-tech for all age groups globally has increased at a 32% average annual pace, from $1.5 billion in 2011 to $4.5 billion in 2015, with investment in preschool through secondary school accounting for the bulk of total investment (38%) over that time span. The explosive growth in ed-tech is concentrated in the US, where 77% of total investment dollars has been directed since 2011, with China and India the next biggest, with 9% and 5% since 2011, respectively.

Out of the approximate $5 billion in total committed to the preschool, primary and secondary markets since 2011, investments in the top 21 companies account for half of all the funds directed to ed-tech. About 70% of the financing for company products targeting these age groups has gone to multimedia content delivery and platforms, online courses and tutoring, foreign language content and literacy and academic-standards-based and Common Core programmes.

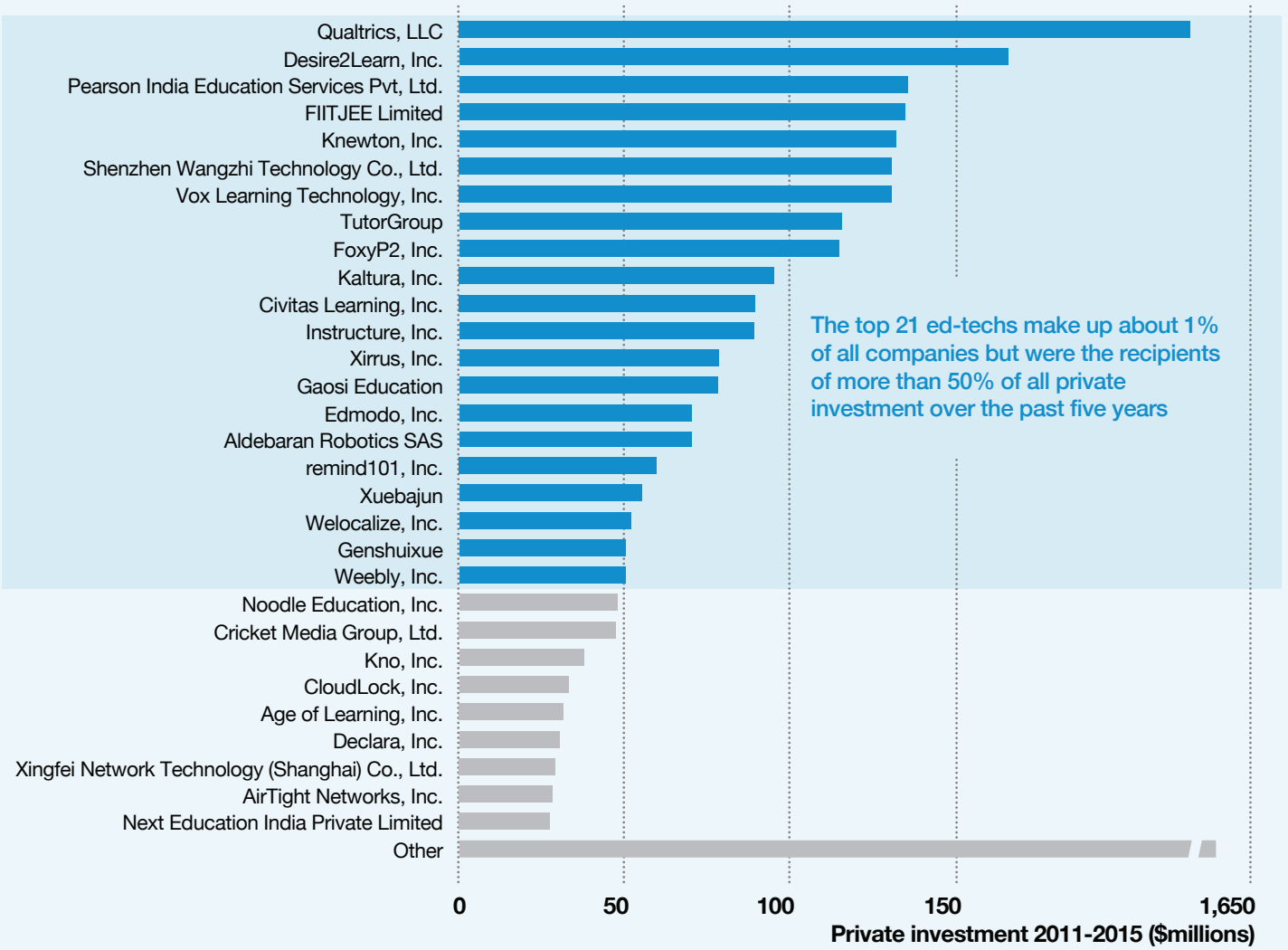
- **Multimedia content delivery and platforms**. Within preschool to secondary school education, investors directed more than $1.2 billion between 2011 and 2015 into multimedia ed-tech. That total includes interactive products and services in formats such as video, music, social media, blogs, presentations and surveys. One example is Qualtrics, a survey platform for organizations focused in part on education. It has raised $220 million since 2011. Another example is Shenzhen Wangzhi Technology Co., which develops social-networking applications for women, including parenting-advice apps, and raised $130 million during the same period. Edmodo, a social network that enables teachers, parents and students to connect with one another, share content and access homework, grades and school notices, raised $70 million in the same period.
- **Online courses and tutoring**. Investors allocated $774 million between 2011 and 2015 to online courses and tutoring companies, which include “massive open online courses” (MOOCs) that can attract many thousands of learners around the world. Varsity Tutors, which offers tutoring and test-preparation services and is considered the foremost live-learning platform for private instructors in the US, recently received $50 million in Series B funding.
- **Foreign language content and literacy**. Investors placed $448 million in programmes that focus on teaching foreign languages and promoting literacy. One example is TutorGroup, an online education platform focused on teaching English to students in China that has raised more than $100 million since 2011.

Private investment in ed-tech reached $4.5 billion in 2015



Note: Data about education technology investments was obtained using specific keywords and filters in the Quid software tool to identify the ed-tech space.
Source: Capital IQ and company websites, from 1 January 2011 to 31 December 2015.

The top 21 ed-techs make up more than 50% of total private investment since 2011



Note: Data about education technology investments was obtained using specific keywords and filters in the Quid software tool to identify the ed-tech space.
Source: Data based on companies' information from Capital IQ and company websites, from 1 January 2011 to 31 December 2015.

– **Academic-standards-based and Common Core programmes**. Investors put $440 million into companies designing programmes to track, assess and improve student performance and outcomes, mainly those that emphasize foundational literacies and Common Core standards. One such example is Renaissance Learning, which has raised $40 million since 2011. Together with its subsidiaries, the company provides assessments and programmes for school improvement for pre-schools through secondary schools in districts in the US and internationally. Its educational software products focus mainly on foundational subjects, such as reading, early literacy and mathematics.

Within these investment themes, several of the largest players are diversified and do not specialize in a single offering. For instance, Knewton is a personalized learning platform that also offers online courses, supports blended learning and provides academic-standards-based content. Pearson India, an online tutoring platform that has attracted attention from investors in recent years, also provides school management technology, curriculum-based digital content and other products.

As discussed in the report, we found that only 5%, or $258 million, of overall global venture capital investment since 2011 has been earmarked for ed-tech products that directly or indirectly support SEL for preschool through secondary school, the focus of our research. About half of that amount targeted multimedia content and delivery platforms ($62 million) and products and programmes for students with special needs ($55 million). We see a potential opportunity to embed SEL in investment areas where we have so far seen limited funding specifically for SEL but where investors we have interviewed have expressed strong interest. Particularly promising opportunities can be found with companies providing online courses and academic-standards-based and Common Core programmes. Because these areas account for roughly a quarter of ed-tech companies directly or indirectly supporting SEL (12% and 15%, respectively), we see an opportunity to “piggyback” on the momentum in these sectors by adding SEL features to the products companies are developing.

Chapter 3: What's holding back adoption of SEL technologies?

Numerous concerns and barriers have stood in the way of more effectively embedding SEL into education, and in ed-tech more specifically. Five interconnected barriers stand out: limited awareness of SEL and its benefits, insufficient prioritization of social and emotional skills, a lack of consensus about valid and reliable SEL measurements, low levels of funding and resources for SEL and an inadequate supply of SEL programmes and products (see Exhibit 6). Collectively, these challenges create a vicious circle that impedes the development of an ecosystem to foster social and emotional skills.

Limited awareness of SEL and its benefits

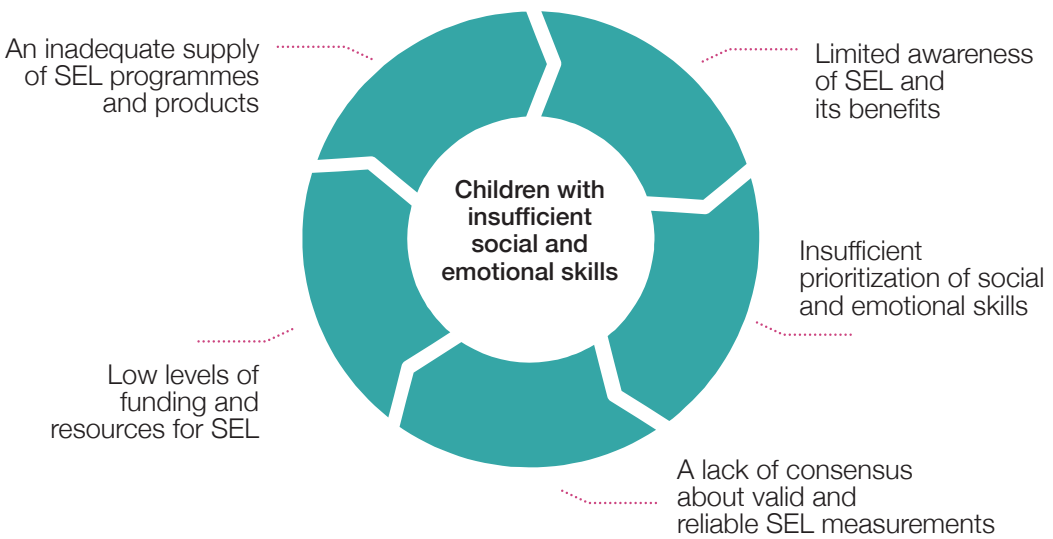
Around the world, we found an incomplete understanding of the positive outcomes of SEL. According to our survey, most parents and teachers are aware of SEL. For example, in the UK and the US, respectively, 82% and 94% of parents and 84% and 87% of teachers reported awareness. In South Korea, 85% of parents and 90% of teachers were familiar with SEL. (See sidebar, Our survey of parents and teachers.)

However, understanding of the promise of SEL and how to foster it, how it is linked to traditional learning and how it creates long-term positive outcomes is not universal. In Kenya, 35% of teachers and 60% of parents indicated that they found SEL strategies useful, compared with 85% of US teachers and parents. Awareness of the effectiveness of play-based learning ranked particularly low. Play was the least popular strategy for developing social and emotional skills with parents and teachers in the US and UK, for example.

We found that most teachers view SEL chiefly as a way to manage classroom behaviour and reduce discipline issues (see Chapter 2). In the US, for example, parents and teachers consider classroom discipline to be the primary short-term benefit of social and emotional skills, outranking improved collaboration, enhanced communication and higher grades and scores. In part, this narrow view of SEL stems from limited training and time to embed SEL into the teaching of foundational academic subjects such as mathematics and language arts, where it shows particularly strong promise.

Our survey also highlighted the need for additional awareness about SEL-related ed-tech. We found that teachers who were already aware of SEL were also very aware of SEL-related ed-tech products (awareness of SEL-related ed-tech exceeded 90% in all countries surveyed). But among parents, awareness of SEL-related ed-tech is not yet particularly well established. Of parents who reported awareness of SEL, only 53% in the UK and 62% in South Korea were also aware of SEL ed-tech. Awareness among parents and teachers remains lowest for the newest forms of ed-tech, such as augmented reality and educational versions of commercial games, ranging from 15% in Kenya to 20% in China.

Exhibit 6: A vicious circle of barriers impedes the adoption of SEL and ed-tech for SEL



Insufficient prioritization of social and emotional skills

Increasing awareness can help address another key challenge to SEL adoption: current attitudes. Overall, many stakeholders do not view social and emotional skills with the same priority they assign to other education skills. Many policy-makers and educators prioritize the development of foundational skills in educational curricula. South Korea is a notable exception: it has mandated that lessons in creativity and critical thinking become a part of its national curriculum (see Chapter 4).

While many parents and teachers recognize the potential for ed-tech to build social and emotional skills, respondents believe ed-tech has more promise for bolstering foundational skills or improving teacher productivity. According to our survey, parents and teachers overall believe that ed-tech is best used for developing foundational skills or for enhancing teacher productivity rather than for teaching SEL. For example, while Chinese parents and teachers have the most positive view of SEL-related ed-tech (66% and 62%, respectively), in the US only 43% of parents and 50% of teachers believe ed-tech is good for SEL, compared with 67% of parents and 66% of teachers who believe it is best for foundational skills.

Another barrier in some countries is a lack of enthusiasm for ed-tech, which stems from concerns that it is just more screen time that threatens to replace human interaction, especially among younger students.

In contrast to that view, we see technology as a tool that a parent, educator or caregiver can use to complement and extend the real-world learning experience – especially given that technology is evolving and promises to enrich rather than replace human interactions. Witness the host of emerging technologies that go beyond the screen and are capable of mixing the physical and virtual worlds and facilitating forms of human interaction impossible a decade ago. Technologies such as virtual, augmented and "mixed" reality; robots; video chats on mobile devices; and virtual tutors allow for a much less passive and more interactive experience.

Lack of consensus about valid and reliable SEL measurements

In the previous *New Vision for Education* report, we found that the majority of existing global assessments measure foundational skills – mainly reading and mathematics. We could find a direct measure of problem-solving and proxies for creativity and curiosity for only about a quarter of the world's countries through the OECD's Programme for International Student Assessment (PISA) test. For the other seven competencies and character qualities, we were unable to find comparable data at scale.

Further, no agreement exists even for how education researchers and thinkers refer to these skills. Currently, people use terms such as *behavioural skills, soft skills, personality traits, non-cognitive abilities, character, socioemotional skills* and *non-cognitive skills* to describe SEL. This lack of agreement about basic terminology limits the ability to measure success.

Overall, the lack of widespread agreement and standardization of metrics has an impact on the types of assessments and products used in all levels of education, the ways that students learn and the approaches that teachers use to teach.

Measurement is a key concern among stakeholders. Lack of measurement emerged from our survey as one of the most important impediments to promoting SEL among parents and teachers in the US, UK, China and South Korea, with 48%-72% of respondents citing this as one of the main barriers to teaching social and emotional skills. Lack of measurement is a particularly important barrier in South Korea and China, where parents ranked it as the top concern, with 65% in South Korea and 72% in China agreeing that a lack of clear measures for social and emotional skills was a main barrier to SEL.

Many common metrics show potential to gain wider adoption in the future but face challenges in adoption, comparability and scalability. For example, some more scalable and widely adopted measures such as the Strengths and Difficulties Questionnaire and the Behavioral and Emotional Rating Scale, currently used by US districts in New York and California, rely on student self-reports or teacher, student and peer reports. They tend to ask respondents to rate themselves or a child on a scale, such as rating the statement "Shares readily with other children (for example, toys, treats, pencils)" on a scale of Not True, Somewhat True or Certainly True. These measures can be simple and inexpensive to administer and can produce consistent results. However, they also can display subtle biases and be difficult to compare across contexts.

Other metrics try to measure SEL indirectly through proxies such as grades, absences and disciplinary infractions. They can be easily embedded into existing data collection efforts and can be highly accurate and predictive. However, research on their validity is still in the early stages and complicated statistical adjustments are required to interpret them accurately.

Efforts are being made to use testing to directly gauge metrics that have proven difficult to adopt and scale because of cost and reliability issues. In 2012, the OECD's PISA incorporated measurements to track collaborative problem-solving and perseverance. PISA plans to extend its assessments by 2018 to measure skills such as intercultural understanding and empathy.

There is ample opportunity to take advantage of digital learning products and platforms to improve SEL measures. Some recently introduced products rely on performance tasks, such as ZooU, which measures response time and accuracy. Other sensor-based measures rely on facial expressions (such as eyebrow movements and smiles); the virtual peer ArticuLab product is one example. (See Chapter 2 for more details.)

Low levels of funding and resources for SEL

Because it's hard to measure SEL consistently, it's hard to hold educators accountable for improving their students' social and emotional skills. Funding is most frequently linked to measurable outcomes and the current lack of a means of measuring SEL results exacerbates the resource constraints. In an environment in which funding is already stretched, educational leaders will allocate resources disproportionately to areas where outcomes and progress can be measured to justify the funding.

According to our survey, 77% of teachers in the US would like to receive additional SEL-related training. The Collaborative for Academic, Social and Emotional Learning (CASEL) recently surveyed a nationally representative sample of teachers and similarly found that 83% of teachers wanted training related to SEL.[29] However, our survey shows that limited resources exist for teaching and professional development related to SEL around the world. The need for more SEL-related training is widespread, with 61% of teachers in Kenya and 78% in the UK stating that they are interested in more professional development on SEL. Moreover, respondents in China, the US, the UK and South Korea cited insufficient knowledge or training as a major impediment to the teaching of social and emotional skills. Despite recognition of the need for SEL, resources are not flowing there.

A survey of Canadian and US teacher-education programmes by researchers at the University of British Columbia showed that few teachers in training are receiving instruction in how to develop social and emotional skills, revealing "that teacher prep programs lag in their understanding that these skills can and should be taught".[30] Our survey confirmed that finding and added a broader international dimension: although teachers in the UK report the highest levels of training in SEL, with 60% receiving training, other countries lag behind that rate. Only 41% of teachers in the US and 36% in South Korea report receiving training in SEL.

Resource constraints in particular hinder ed-tech adoption. For example, developing countries and regions such as sub-Saharan Africa frequently lack adequate technology infrastructure and have large gaps in digital skills. Students and educators even in developed countries like the US may lack access to computers or the internet. Indeed, in our survey, we find that the cost of technology is an important challenge, particularly for parents; this is true for all countries. For example, 75% of parents in China and 78% of parents in the US cite the cost of technology as one of the primary barriers to using SEL ed-tech.

In most countries, schools allocate more resources to technology for foundational skills, as is the case in South Korea. Kenya allocates most of its technology resources to IT infrastructure, and the UK focuses on teacher training. China is the only country we studied that allocated more money for SEL ed-tech than other categories: Tech spending for SEL ed-tech is $1,529 per child per year on average in China, higher even than the US. This is not surprising given that Chinese parents and teachers also currently place the highest emphasis on SEL (98% and 91%, respectively) relative to those in the other countries surveyed. Note, however, that our data for China is drawn only from the major cities of Shanghai and Beijing; spending in other parts of the country might lower the average for China overall. The picture looks quite different in Kenya, which allocates resources to address more fundamental infrastructure requirements and places the lowest emphasis on SEL (54% of parents and 51% of teachers).

Inadequate supply of SEL programmes and products

The cumulative impact of the preceding challenges has created a large void in the programmes and products needed to improve SEL development. One gap comes in the form of SEL programmes. In fact, the number of effective school-based SEL programmes has not grown appreciably over the past two decades. CASEL published its first review of SEL programmes in 2003 (Safe and Sound, which covered more than 240 programmes) and recommended 22 programmes that satisfied its rigorous evaluation and design criteria. In 2013, a decade later, while the criteria for inclusion broadened, CASEL's list of recommended programmes included only 22 preschool and elementary programmes, out of a review of more than 200 SEL programmes, and in 2015 CASEL included only nine high-school and middle-school programmes (out of 380 reviewed) on its recommendation list.

CASEL has found that educators are increasingly interested in going beyond classroom-based implementation of a single SEL programme to coordinated, systemic school-wide and district-wide SEL programming. But overall progress in implementing such programmes has been limited. In the instances in which progress has been made, the efforts have been focused narrowly on specific classroom management or behavioural problems, such as preventing bullying.[31]

A 2012 survey confirmed this finding. Nearly all teachers (88%) reported that SEL occurs in their schools on some level, but less than half (44%) said that a programme was in place to develop social and emotional skills throughout the school.[32] Almost one-third of teachers (30%) said that their schools do not sufficiently emphasize social and emotional skills. In contrast, only 7% reported that their schools do not place enough emphasis on non-SEL content and subject areas.

The void in SEL programmes is also reflected in a wide-ranging need for software and technology products for educators as well as products that children can use to develop social and emotional skills. Among the pre-, primary- and secondary-school markets, investors have committed about $5 billion since 2011 to education technology, the bulk of which has targeted multimedia, standards-based content delivery and online courses and tutoring. Our research found that out of the 1,800 companies identified in the landscape of companies with ed-tech products serving the preschool through grade 12 market, fewer than 150 companies, or 8%, directly or indirectly support SEL.

Widespread adoption of SEL and of SEL-related ed-tech solutions faces several barriers: limited awareness, insufficient prioritization, lack of consensus about measurements, low levels of funding and resources and an inadequate supply of programmes and products. These barriers form a vicious circle, hindering the development of social and emotional skills, but are not impossible to overcome. We believe that with the right approaches, stakeholders can increase the adoption of ed-tech for SEL.

Our survey of parents and teachers

Respondents to our survey shared similar views across an array of questions related to SEL and technology. In particular, both parents and teachers across all countries attached great importance to SEL and shared a positive view of the potential for technology to advance education and to promote social and emotional skills in particular. However, notable differences emerged across countries in the survey, mainly related to views about the perceived barriers to success and about the long-term benefits of promoting SEL. Finally, while we find commonalities across the technologies used in the classroom, we also find differences in the use of early-stage technologies across countries.

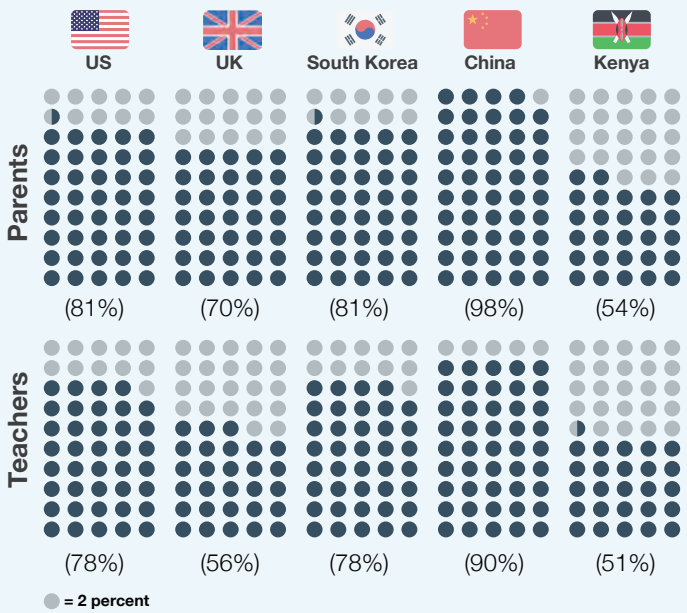
Parents and teachers place high emphasis on teaching social and emotional skills. More than 90% of parents and teachers in China emphasize teaching children these skills. In the US, a similarly high number of parents (81%) and teachers (78%) emphasize SEL. Parents and teachers are mostly in alignment about the importance they place on these skills, except in the UK, where parents are substantially more likely than teachers to report placing more emphasis on social and emotional skills (70% of parents versus 56% of teachers). Meanwhile in Kenya, the majority of parents and teachers emphasize social and emotional skills, although they place the least emphasis here relative to other countries, with only 54% of parents and 51% of teachers emphasizing SEL.

In addition, we find that parents and teachers share similar views about the potential of education technology. Those in China and the US were most enthusiastic about the potential of ed-tech, with parents and teachers deeming technology important for overall teaching and learning (90% of parents and 83% of teachers in China and 86% of parents and 82% of teachers in the US). Again, we found the largest discrepancy in Kenya: parents and teachers there were the least likely to be satisfied with technologies for learning, with only 65% and 59% of parents and teachers, respectively, seeing a role in learning for ed-tech.

We find stark differences across countries in terms of how respondents perceive the long-term benefits of SEL. For example, survey respondents in the US and UK see academic preparation as the key benefit of fostering SEL: a majority of teachers in the US (64%) say teaching social and emotional skills will increase the likelihood of children graduating from high school, and parents in the US and the UK believe that SEL can increase the likelihood of a student going to college (79% and 65%, respectively). On the other hand, parents and teachers de-emphasize academics as a key benefit in South Korea and China. About three-quarters of parents and teachers in China believe SEL will have a major benefit on children's likelihood of being happy as an adult (80% and 74%, respectively); the same belief applies to South Korea, where 85% of parents and 70% of teachers link SEL with happiness.

Teachers and parents place high emphasis on SEL

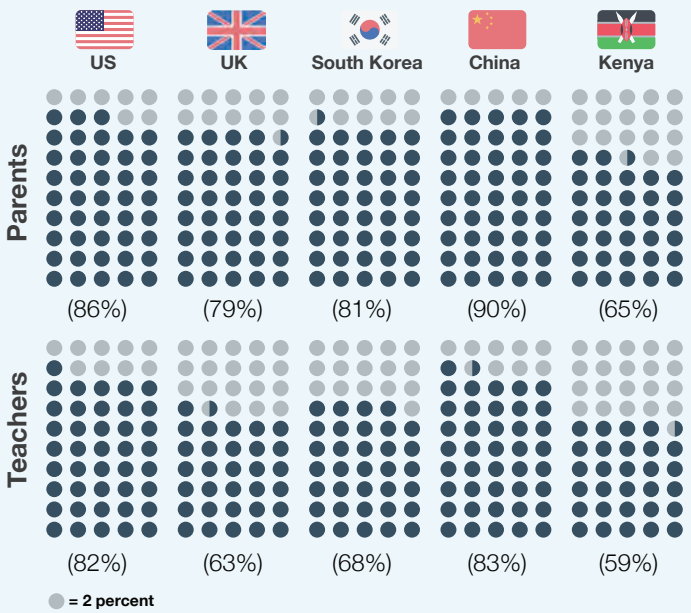
How much emphasis do you place on teaching competencies and character qualities?
(Strong emphasis or more than average emphasis)



Note: The survey question was "How much emphasis do you place on teaching competencies and character qualities in your classroom?" (in your home for parents). Respondents had five options: no emphasis at all, some emphasis, average emphasis, more than average emphasis and strong emphasis.

Teachers and parents place high emphasis on technology for learning

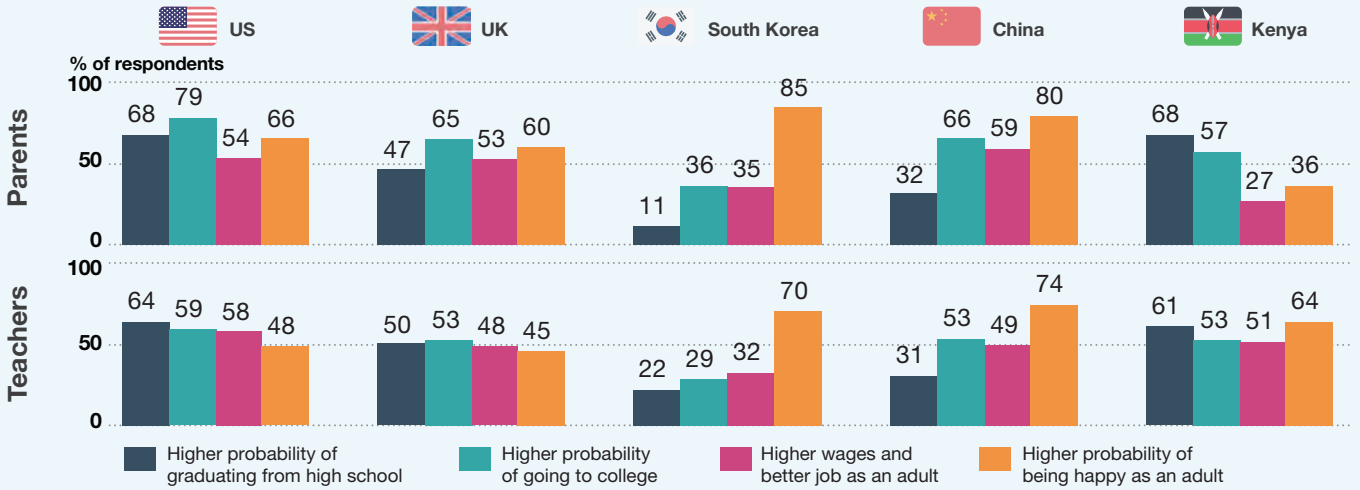
How important do you think the use of technology is for facilitating learning in children?
(Important or highly important)



Note: The survey question was "How important do you think the use of technology is for facilitating learning in children?"
Respondents had five options: not at all important, somewhat important, average, important and highly important.

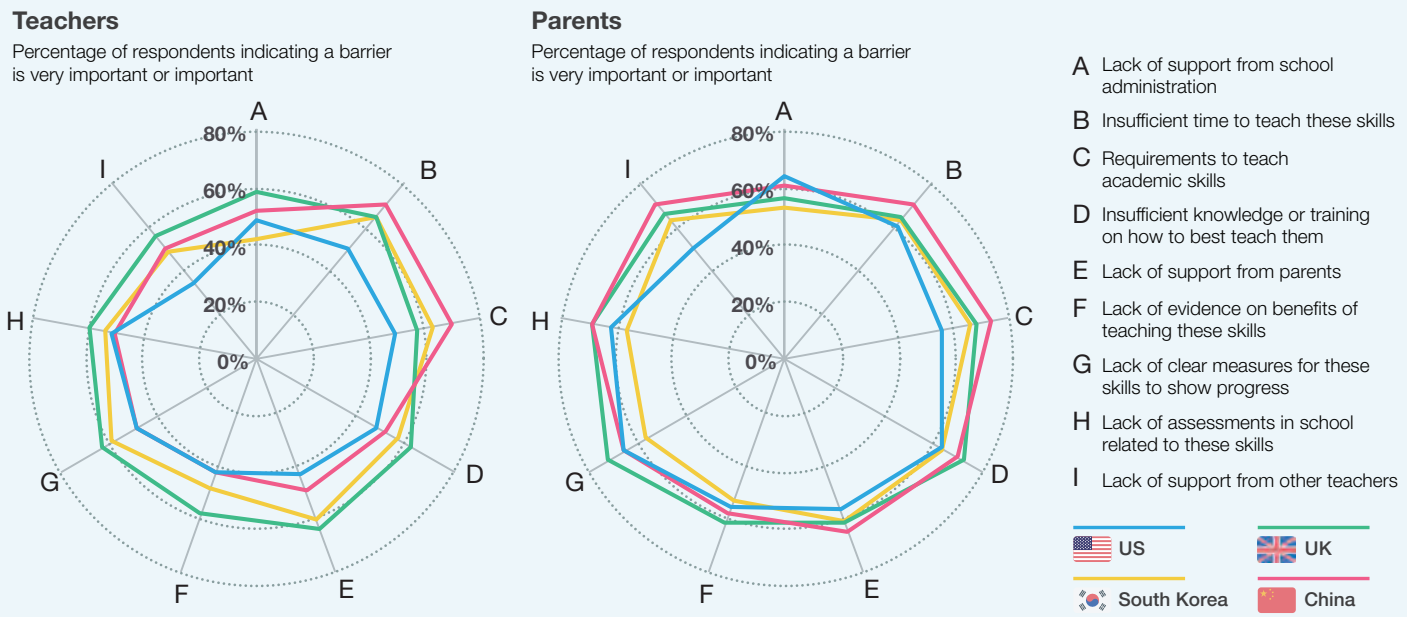
Teachers and parents ascribe long-term benefits to SEL

Do you believe there are other longer-term benefits to teaching social and emotional skills?



Note: The survey question was "Do you believe there are other longer-term benefits to teaching social and emotional skills? If so, which ones?" Respondents could select all options.

Critical barriers limit the promotion of SEL



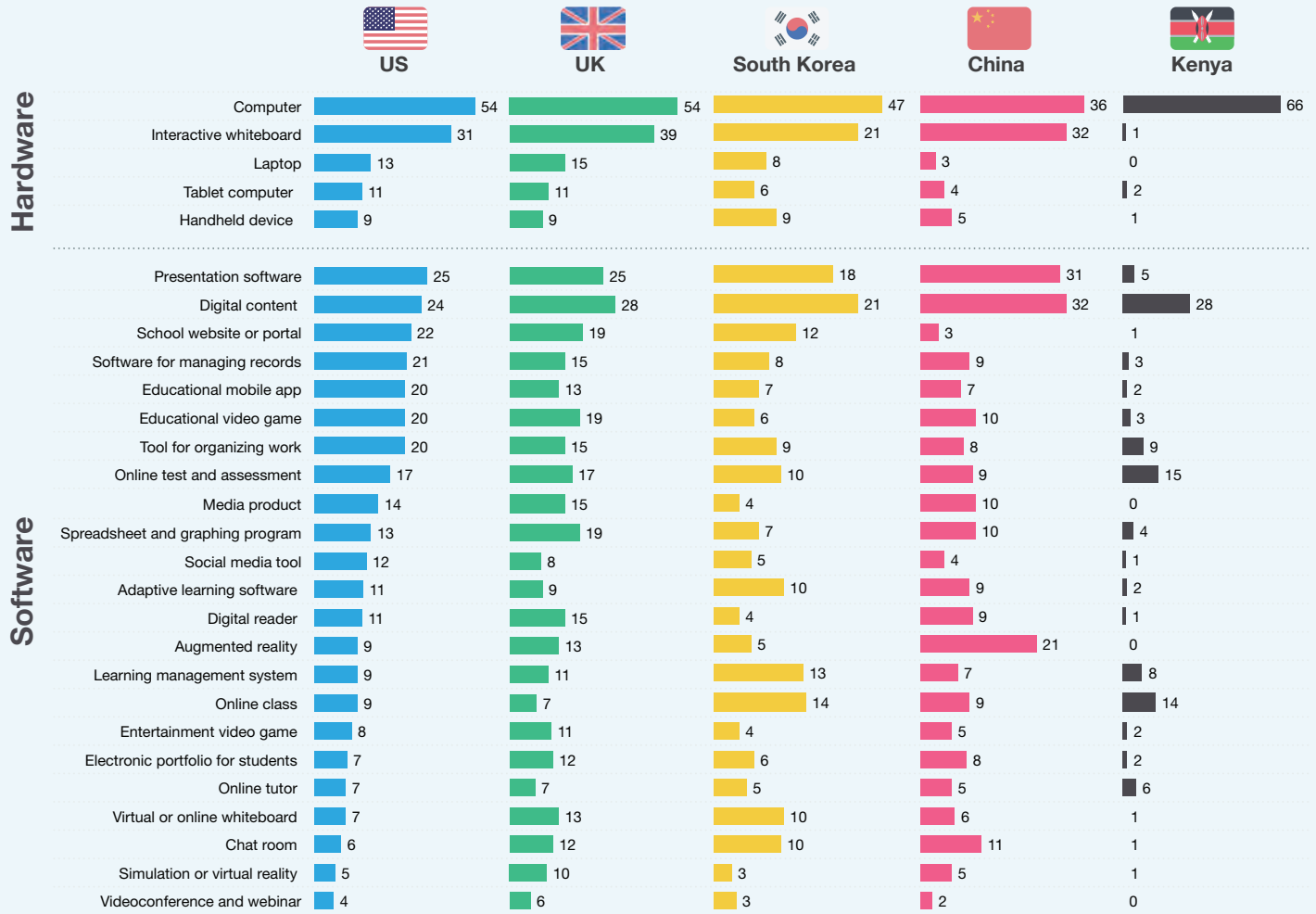
Note: The survey questions was "In your opinion, what are the main barriers to teaching your students these skills?" Respondents had five options: not at all important, somewhat important, average, important and highly important. Kenya was excluded from this exhibit because of an insufficient sample size responding to this question.

When asked about the key barriers to SEL, parents and teachers often cite insufficient time and requirements to teach academic skills. This is particularly true for parents and teachers in the US, where 71% of both groups report insufficient time and 74% of parents and 70% of teachers see academic requirements as the main barriers. In Asian countries, the key barriers for both parents and teachers are a lack of clear measures and school assessments; parents in particular highlight insufficient training or knowledge of SEL.

Finally, the most-reported technologies used in the classroom are consistent across most countries, with the majority of teachers using presentation software and digital content on computers in their classrooms. We find that interactive whiteboards are common in most countries except Kenya: 21% of teachers in South Korea report using interactive whiteboards in their classrooms and 39% in the UK, whereas in Kenya only 1% of teachers report using them. In the US, teachers report using several other software products less common in other countries we surveyed, such as school websites (22%), software for managing records (21%) and mobile education apps and video games (20%). Educational video games are also popular in the UK (19%). But some differences exist in the use of newer technologies. Teachers in China reported the highest use of augmented-reality technology (21%), while online classes ranked highest in Kenya and South Korea (14%).

Teachers use a range of technologies in classrooms

Percentage of respondents indicating that they used each technology



Note: The survey question was "Do you use any of these technologies in your classroom?" Respondents could select all options.

Chapter 4: The way forward for SEL

No one-size-fits-all solution exists to develop social and emotional skills. Rather, advancing SEL will require sustained effort from a multifaceted ecosystem of stakeholders who collectively must overcome unique cultural challenges as well as shared barriers that slow the development of SEL worldwide. That ecosystem includes policy-makers, educators, parents, researchers, businesses, technology developers and investors (see Exhibit 7). These stakeholders must collaborate to devise solutions that foster SEL both at home and in school and through multiple learning strategies and approaches.

Finding those solutions is a complex but achievable undertaking (see Appendix 3 for examples of successful education-reform initiatives). Given the barriers that are holding back adoption and implementation of SEL and SEL ed-tech, stakeholders at the global, country and individual levels must make it a priority to place SEL high on their agendas. Before stakeholders at each of these levels can implement policies and approaches, they first need to agree on the problems that must be solved and position those problems for broad attention, as we discuss in this chapter.[33] Specific issues include the confusing array of SEL definitions and terminology, the lack of focus on SEL in curricula, the limited supply of SEL-related education technologies and the lack of means to measure outcomes and assess progress when it comes to SEL programmes and SEL ed-tech tools.

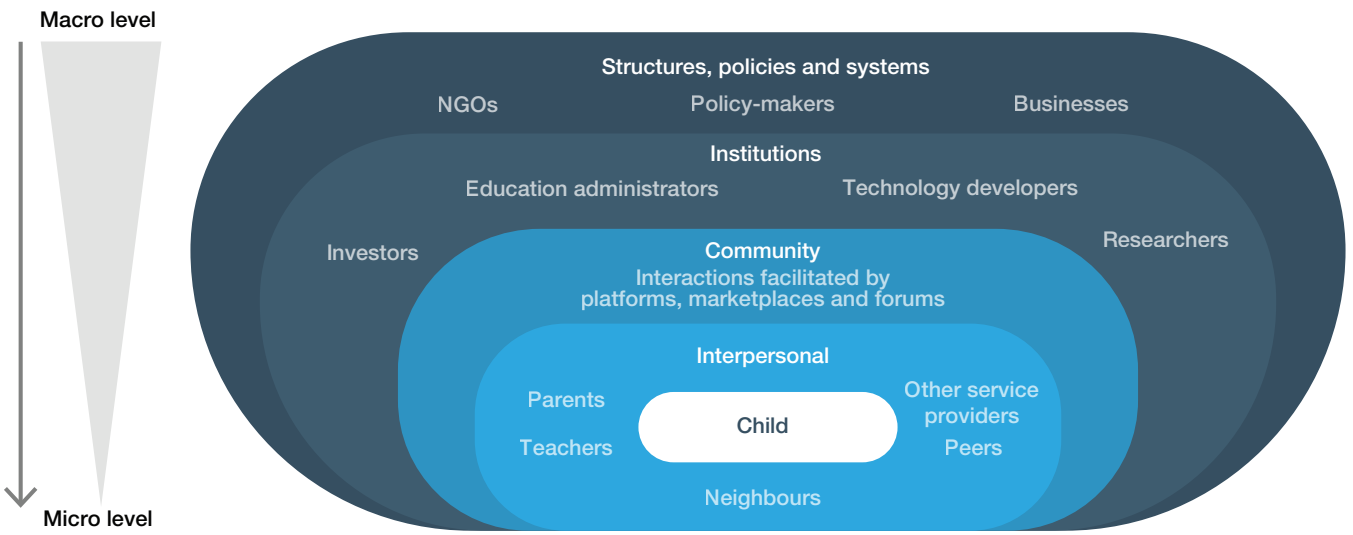
How global organizations shape the agenda

Global organizations such as the OECD, UNESCO and the World Bank are well positioned to help advance the international agenda. Their analyses and recommendations demonstrate the importance of social and emotional skills in the 21st century. And these organizations provide financing and other assistance (such as a policy framework) for the education reform agendas of individual countries. This is particularly relevant for developing countries, where global organizations often have a strong presence.

Such organizations are also uniquely positioned to mobilize the skills and other resources of diverse global actors, facilitating exchanges and partnerships among stakeholders and institutions that cut across national, institutional and disciplinary lines. Additionally, they provide forums to bring together relevant stakeholders to find feasible solutions to the gaps in the development of social and emotional skills. The following examples showcase the power of global organizations to shape and facilitate the SEL agenda:

– The OECD has influenced global education reform by creating tools to measure progress in individual countries and tracking and publishing results. Specifically, the OECD's PISA demonstrates the power of standardized education measurements to shape the education agenda of individual governments. PISA makes it possible to compare performance in the development of many foundational skills such as literacy and numeracy across countries, thereby identifying areas of relative strength and weakness. The information has triggered

Exhibit 7: A complex ecosystem supports SEL



Adapted from Bronfenbrenner, U., "Ecological model of human development", *International Encyclopedia of Education*, Vol. 3 (2), 1994.

education reforms in several countries.[34] Recently, the OECD updated PISA to include a measure of creative problem-solving. This is a giant step towards recognizing the importance of social and emotional skills.

– UNESCO has reinforced the leading role it established in coordinating the World Education Forum 2000 by helping to shape the UN's 2030 education agenda and its related Sustainable Development Goals.[35] Notably, UNESCO has helped to bring business into the global discussion. For instance, UNESCO has agreed to partner with Microsoft to jointly develop programmes and solutions that use technology to improve childhood education.
– The World Bank has developed STEP (Skills Toward Employment and Productivity), a survey that collects data about technical, foundational and social and emotional skills through employment interviews. STEP makes it possible to compare international data about skills and identify skill gaps.

Having a set of clear and measurable targets is an important catalyst for change, as the UN's Millennium Development Goals have demonstrated in achieving universal primary-school education. When coupled with efforts such as cross-country studies identifying gaps in social and emotional skills, like the OECD's recent *Skills for Social Progress,* goal-setting can spur action to support SEL.[36]

How country-level organizations advance the agenda

Organizations at the national, state and local levels play a crucial role in setting an agenda for policy-making that would further SEL and SEL-related ed-tech. These organizations range from education ministries and state legislatures to local school districts and NGOs. However, not all organizations influence the agenda in the same way. That's because the precise roles of stakeholders vary by context – including the level of centralization of a country's government, for instance, and a country's income level.[37]

Where education systems are centralized, as is the case in South Korea and Singapore, we have observed that a high-level government agency often plays a leading role in advancing a change agenda. Typically, a centralized government can react more rapidly than a decentralized government to new information and changes in needs and priorities. For example, in the 1990s, South Korea's education ministry developed the agenda that led to the incorporation of creativity and critical thinking into the national curriculum. On the other hand, in decentralized environments such as the US, state and local leaders tend to play a large role in setting the agenda, with coordination and influence from the federal level.

The other context to consider is a country's income level, which influences the types of stakeholders involved in setting the agenda and their roles in creating change. Governments may not always play a leading role. In developing countries such as Jamaica, the role of parent and teacher organizations has proved particularly critical to raising awareness, soliciting funds and spurring action, as the government had different priorities. Support from non-government entities such as NGOs and business can also be a leading catalyst for change in developed countries.

How individual stakeholders influence the agenda

Individual stakeholders can also come together to advance strategies and ed-tech for SEL. To help get SEL on to the policy agenda, individual stakeholders can take advantage of their unique strengths (see Exhibit 8).

Policy-makers

Policy-makers must stand at the forefront of setting the agenda for policy change. Because SEL promises societal gains and a means of meeting the demands of the changing economy, policy-makers should include SEL high in their agendas, measure its benefits, set standards and accountability related to SEL and support the integration of SEL into education systems. They should provide the funding and other resources to discover the most effective learning models and assessment methods, supporting schools as they experiment with different approaches. Policy-makers should also help to disseminate the best practices that result from experimentation. They should likewise promote the adoption of SEL-related ed-tech by providing opportunities for educators to experiment with innovative technologies, regulating the standards and ratings process (where applicable) and funding research and programmes to advance the development of SEL-related ed-tech.

Educators

Educators need to engage with other stakeholders to create or pilot SEL programmes, including those that incorporate ed-tech. They must work closely with parents to integrate SEL into both school and home so that children have access to cohesive and comprehensive SEL. Part of their role is to communicate with parents about the different kinds of SEL products, their benefits and the need for standards. They can also use digital games to engage students and complement classroom activities. It is important that educators use the list of features we have offered and focus on the SEL products that demonstrate high effectiveness.

Parents

To ensure that their children receive a high-quality education providing SEL as well as academic preparation, parents need to be advocates and to petition educators and organizations to promote SEL, supporting efforts to integrate school and home programmes to develop social and emotional skills holistically. They must make a concerted effort to help their children learn social and emotional skills at home. They must also push for SEL curricula, standards and ed-tech products. With regards to SEL-related ed-tech solutions, parents once again need to be advocates, pushing for product standards as well as using the list of features we created to ensure that their children are getting the maximum benefits from SEL-related ed-tech.

Researchers

Given the void in understanding how best to promote SEL and which SEL ed-tech products and programmes are most effective, researchers must collect and analyse data that demonstrates the effectiveness of SEL and SEL-related ed-tech as well as the efficacy of product standards and ratings. They must also explore assessment methods that can directly measure outcomes and allow for comparisons across settings and countries, devising new measures of 21st-century skills and validating existing ones. They should promote their findings through forums, reports or other efforts.

Businesses

To ensure that the labour force of the future is prepared to compete in the rapidly changing economy, businesses must be involved in creating and supporting SEL programmes. They should partner with educators and researchers to be part of the solution and ensure that social and emotional

Exhibit 8: Individual stakeholders can advance strategies and ed-tech for SEL

Context	Policy-makers	Educators	Parents	Researchers	Businesses	Tech developers	Investors
How to advance SEL	**Include SEL in the policy agenda**, starting with measurement and assessments **Promote and regulate** SEL product standards and ratings **Fund** research and initial programmes focusing on SEL and assessments	**Partner** with key stakeholders to create and pilot relevant SEL solutions **Hold forums** with key stakeholders **Experiment** with SEL and efforts to integrate school and home learning **Communicate** benefits and solutions to parents	**Get information** to understand best practices and solutions **Communicate** needs to educators and local NGOs **Encourage** children's participation in SEL programmes and efforts to integrate home and school learning	**Produce and make public** evidence from SEL programmes **Assess validity and reliability** of current assessment methods and direct measurements **Promote benefits of SEL and assessments** across key stakeholders	**Partner** with key stakeholders, including researchers and educators, to be part of the solution **Include SEL assessments and measures** for talent hiring	**Partner** with researchers, investors, businesses and educators to create and pilot relevant SEL solutions **Use** newer types of technologies at home and school	**Fund** SEL solutions and lobbying with long-term or mission-oriented objectives **Partner** with key stakeholders to identify the overlap between market needs and education impact
How to embed SEL into ed-tech	**Promote the need for** SEL product standards, ratings and reviews **Fund** research and initial programmes on SEL-related ed-tech **Promote** public-private partnerships	**Experiment** with SEL-related ed-tech **Use SEL products** with evidence of positive impacts **Use the feature list** to choose products[1]	**Promote the need for** SEL product standards, ratings and reviews **Use the feature list** to choose products[1]	**Promote the need for** SEL product standards, ratings and reviews **Provide evidence** about the best features for SEL-related ed-tech and an action plan for implementation	**Fund and partner** with universities and research centers to help develop solutions to the skills gap	**Promote the need for** SEL product standards, ratings and reviews **Use the feature list** as a starting point to develop ed-tech products with embedded SEL features[1]	**Promote the need for** SEL product standards, ratings and reviews **Use the feature list** to identify products with embedded SEL features[1] **Partner** with technology developers, educators and key stakeholders

[1] Feature list can be found in Exhibit 4.

skill development is positioning students for success in the evolving workplace. They should increase their involvement in the development of policies that link SEL to business needs.

Technology developers

As parents and educators increasingly demand products that can foster skill development, technology developers should use our list of features to better understand what works for SEL. They need to partner with investors, researchers, businesses and educators to create, pilot and refine the most effective products. They, too, need to advocate for product standards and ratings and take advantage of the different uses of technology at home and at school – and the opportunities to link these two different contexts.

Investors

The role of investors is to fund the technology developers working to embed SEL into academic ed-tech products focused on foundational skills and to promote the need for standards and ratings that will help customers understand which products to purchase. Investors have an incentive: an untapped opportunity for ed-tech products that provide the SEL support that parents and educators are interested in as well as the foundational-skill development they increasingly demand.

How to foster collaboration among stakeholders

Collaboration among stakeholders is essential as they set the agenda for change. After all, the efforts of individual stakeholders will yield insights that could help others: the reports that researchers generate will help parents and educators to better understand the product features that support SEL, for instance, and the experiments that educators conduct will provide information to help technology developers create more effective SEL-related ed-tech products. In multiple ways, stakeholders working collaboratively will produce mutually reinforcing data, concepts and lessons.

Several existing platforms, marketplaces and forums are helping to facilitate stakeholder collaboration. Google, for example, has added a category for education-related software in its Apps Marketplace, providing a forum for rating apps and bringing together investors, technology developers and educators. Technology developers are turning to crowdfunding platforms such as Kickstarter to raise money from interested parents and educators. The Center for Education Innovations has analysed nearly 700 education innovations – including more than 140 ed-tech products. It engages local stakeholders and connects students and educators through an online platform and a network of organizations.

It will take the cumulative effort of many individuals and organizations to prepare children with the social and emotional skills they will need to thrive. That said, countries still face both unique and shared challenges to integrating SEL and SEL-related ed-tech into their educational curricula. But we have seen education reform work around the world, in countries with very different governmental systems and economies. By working together, policy-makers, educators, parents, businesses, researchers, technology developers, investors and NGOs enhance learning and ensure that development of social and emotional skills becomes a shared goal and competency of education systems everywhere.

Appendix 1: Definitions of SEL strategies

SEL strategies common to all skills

SEL strategy	Definition
Allow time to focus	Provide child with enough time and attention to allow him or her to focus on specific learning objectives (for example, set aside time for skill development).
Break down learning into smaller, coordinated pieces	Invest time and effort to develop a child's new behaviours and skills by breaking down learning into smaller steps and sequential and coordinated sets of activities to give the child an opportunity to link learning steps.
Create a safe environment for learning	Create an environment that is physically and emotionally safe for the child.
Develop a growth mindset	Provide appropriate praise focusing on the child's efforts and learning process instead of praising final outcomes or the child's intelligence. Teach the child the incremental theory of intelligence, which teaches that intelligence is malleable, fluid and changeable.
Encourage play-based learning	Provide open-ended, unscheduled time to freely and creatively explore without restrictions, rules, guidelines or pressure.
Foster nurturing relationships	Engage child in a relationship that stimulates his or her growth and development.
Foster reflective reasoning and analysis	Apply instructional strategies that require the child to analyse complex topics and reflect on his or her analyses.
Guide a child's discovery of topics	Balance student discovery, answering questions and working through challenges providing feedback, assessment and explicit instruction. A crucial component of this strategy is to provide scaffolding, offering support tailored to each child's needs with the expectation that assistance will diminish and be removed as the child is able to achieve the task or master the concept.
Help a child take advantage of his or her personality and strengths	Help the child understand his or her tendencies and temperament and equip the child with strategies to harness strengths and cope with weaknesses.
Offer appropriate praise	Provide praise that encourages effort and specific accomplishments, not ability. The child must believe that the praise is genuine (related to growth mindset).
Offer engaged caregiving	Be involved and engaged with the child, helping to nurture the child's learning and development.
Provide appropriate challenges	Use material that is challenging for the child but attainable with reasonable effort.
Provide clear learning objectives that target skills	Provide the child with clear and specific learning objectives by identifying explicitly what skills children are expected to learn.
Use a hands-on approach	Use instructional strategies that involve learning by doing and thus allow the child to actively participate in an activity, typically including objects, materials and other elements.

SEL strategies targeted to specific skills

SEL strategy	Skills	Definition
Build confidence in the ability to succeed	Initiative	Help the child build positive self-esteem.
Build in opportunities to learn from failure	Persistence/grit	Help the child learn to overcome obstacles by allowing him or her opportunities to fail in ways that are appropriate given his or her temperament.
Create a language-rich environment	Communication	Expose the child to spoken and written language frequently.
Encourage empathy	Leadership, social and cultural awareness	Help the child learn how to understand the feelings of others and share his or her feelings openly.
Encourage questions/guessing	Curiosity	Answer the child's questions, provide resources to help answer his or her questions and encourage questioning and guessing.
Foster cultural self-awareness	Social and cultural awareness	Help the child understand and contextualize his or her values, beliefs and perceptions.
Foster greater respect and tolerance for others	Collaboration, social and cultural awareness	Help the child respect opinions and perspectives that he or she does not necessarily agree with.
Foster the ability to negotiate	Leadership	Help the child learn to make compromises and come to agreements.
Foster the ability to process emotions	Adaptability	Help the child understand, identify and express his or her feelings in a healthy way.
Give constructive feedback	Critical thinking/problem-solving	Offer constructive criticism to help children improve their performance through a better understanding of the information provided.
Instil sufficient knowledge to ask questions and innovate	Curiosity	Ensure that the child has enough fundamental knowledge to ask meaningful questions and create and produce novel material.
Offer opportunities to build and innovate	Creativity	Provide the child with opportunities to create things.
Practise both flexibility and structure	Adaptability	Help the child respond to unexpected outcomes based on his or her tendency to be primarily flexible or rigid.
Provide autonomy to make choices	Creativity, curiosity, initiative	Provide the child with opportunities to make meaningful choices that give him or her a sense of control.
Provide long-term, engaging projects	Initiative	Help the child become involved in long-term projects in which he or she is emotionally invested.
Provide opportunity for group work	Collaboration	Create activities that require the child to work with others to achieve similar goals.

Appendix 2: Definitions of ed-tech features

Ed-tech features for all skills

	Features	Skills	Definitions
Structure of interactions	Allow for turn-taking	All	Allows for the role of participant and observer to alternate from one user to another.
	Allow play over multiple sessions with breaks	All	Allows for use and play to take place over time, or across sessions; game is replayable or includes breaks.
	Allow verbal and non-verbal responses	All	Reacts to users' actions, words and expressions.
	Create safe environments to explore and experiment	All	Provides a safe environment where users have autonomy to explore, experiment and create.
	Enable game customization and modification	All	Allows users to change aspects of software or a device such as by enabling download of new quests and creation of key features of a game's characters.
	Include engaging characters	All	Includes characters that are captivating, relevant and interesting to users.
	Include virtual characters that can interact with players (embodied conversational agents)	All	Includes computer-generated cartoon-like characters that demonstrate many of the same properties as humans in face-to-face conversation, including the ability to produce and respond to verbal and nonverbal communication.
Elements of play	Allow for management of complex systems	All	Simulates intricate and elaborate processes requiring users to adjust variables to obtain results.
	Encourage players to apply knowledge learned in games (action domain link)	All	Includes situations where the users need to apply knowledge gained from game. The link to reality is close enough that users can observe possible real-world applications.
	Facilitate resource management	All	Creates situations in which users must optimize the use of scarce resources.
	Increase difficulty level as play progresses	All	Changes difficulty level as users work their way through the game.
	Make play adaptive to performance	All	Presents choices or paths and modifies the difficulty level in response to the actions of users.
	Offer non-linear narratives	All	Dynamically generates plot elements and alters potential endings based not only on the choices a user makes but also on factors such as their performance or timing.
	Provide direct SEL instruction	All	Provides direct instruction on improving a specific social and emotional skill, such as communication.
	Reveal hidden information through players' actions	All	Includes certain information about current and future states hidden and potentially available to players through specific actions.
Assessment and reinforcement	Allow for writing notes and journal entries	All	Allows users to keep a written record of events during the game.
	Encourage players to narrate plans and actions taken in game	All	Provides the opportunity for users to describe their activity inside and outside the game.
	Include aids for teachers and parents	All	Provides support materials to enable teachers, parents and other learning facilitators to engage with users.
	Include stealth assessment	All	Monitors and analyses data to help a teacher or parent assess a user's performance.
	Offer immediate feedback about performance	All	Provides users with immediate assessments on their performance.
	Offer meta-cognition strategies	All	Provides helpful meta-cognition strategies such as modelling, thinking aloud or self-recording to improve players' awareness of their thought process and ability to control the learning process.

Ed-tech features for specific skills

Features	Skills	Definitions
Allow communication over social media	Collaboration, communication, social and cultural awareness	Allows users to communicate using a built-in social media platform.
Allow for open-ended exploration	Critical thinking/problem-solving, curiosity	Includes multiple paths to a potential solution.
Allow for voice communication	Communication, collaboration	Allows users to talk with each other using a built-in platform.
Allow multiple players	Collaboration	Includes the option to include more than one user in game.
Allow players to debrief or reflect on their performance	Critical thinking/problem-solving	Includes a session after the game in which users can talk about their experience in the game.
Allow players to share proposals	Critical thinking/problem-solving, collaboration, communication	Allows users to share potential solutions with one another.
Allow practice without penalty	Initiative, adaptability	Allows users to practise without affecting their score or status negatively.
Award players with prizes	Critical thinking/problem-solving, persistence/grit	Provides users with rewards for action taken.
Build in written ways to communicate	Collaboration, communication	Includes in-game written communication tool or chat feature, such as text messaging or emoticons.
Combine multiple parts of game into a new form	Creativity, curiosity, initiative	Allows users to combine multiple disparate units to form new object or concept in the game; units can be physical or virtual.
Connect game to players' interests (problem-learner link)	Critical thinking/problem-solving	Includes a location, theme and story that relate to users' interests, thus making the game relevant to them.
Create characters and build virtual products	Curiosity, creativity, initiative, adaptability	Allows for users to make, create or design an object within the game; an example would be a user customizing or developing his own character.
Create complementary roles for different players	Collaboration, communication	Enables different users to embody characters that have complementary roles.
Embed fantasy-like themes	Creativity	Includes make-believe aspects like the environment, narrative scenarios or player roles that can be interacted with.
Embed subject-matter tutoring	Critical thinking/problem-solving, curiosity	Provides direct content on specific subject matter.
Encourage interaction with other players	Collaboration, communication	Facilitates activity between users.
Encourage negotiation through the exchange of virtual goods	Leadership, social and cultural awareness, adaptability	Allows users to trade objects within the game.
Encourage role-playing and perspective-shifting	Creativity, adaptability	Allows users to operate from the perspective of another character, real or virtual.
Encourage the completion of goals	Initiative	Provides motivation for users to take actions that lead to a goal.
Encourage work with others towards common goals	Collaboration, leadership, social and cultural awareness	Requires collaboration with other users in order to progress.
Facilitate offline group activity and quests	Creativity, collaboration, curiosity, initiative	Allows users to take part in real-world group activities outside the game in order to progress within the game.
Feature conflict or competition with others	Persistence/grit	Provides situations in which the interests of two or more users are in opposition.
Feature rankings and leader boards	Persistence/grit	Allows users to see their standing compared with that of other users.
Make uncertainty salient to players	Curiosity	Allows users to navigate uncertainty by highlighting areas that need to be discovered to achieve goals.
Manage multiple goals	Initiative, adaptability	Includes various goals and levels.
Offer augmented reality and simulation	Creativity	Combines a virtual-reality setting with real physical materials, instruments and feedback; mimics properties of real-world environments.
Offer help, hints, instructional supports	Critical thinking/problem-solving	Includes comments, tutorials and other hints that enable users to get started quickly, overcome difficult situations or get acquainted with new aspects of the game.
Offer incentives to mentor other players	Collaboration, leadership, social and cultural awareness	Rewards users for helping and advising other users.
Offer opportunities to make choices	Creativity, curiosity, initiative	Includes a concrete set of options for users.
Provide long-form play	Initiative	Provides opportunity for users to play the game in more than one session.
Provide multisensory learning materials	Curiosity	Integrates visual, auditory, tactile and kinesthetic learning elements to activate different parts of the brain.
Provide puzzles that are solvable with effort	Curiosity	Includes problems that demonstrate a manageable knowledge gap.
Reward guessing with feedback on correct answers	Curiosity	Requires users to resolve questions while providing guidance and input to reveal users' gaps in knowledge.
Reward partial steps	Curiosity	Recognizes users' partial progress towards a goal.

Appendix 3: Education reform in action

Several models have been used to achieve change in complex public-policy issues (see Chapter 4).[38] In this report, we refer to the process as the "cycle of public policy change". The cycle has five discrete stages: agenda setting, analysis, policy formulation, implementation and policy review and evaluation.

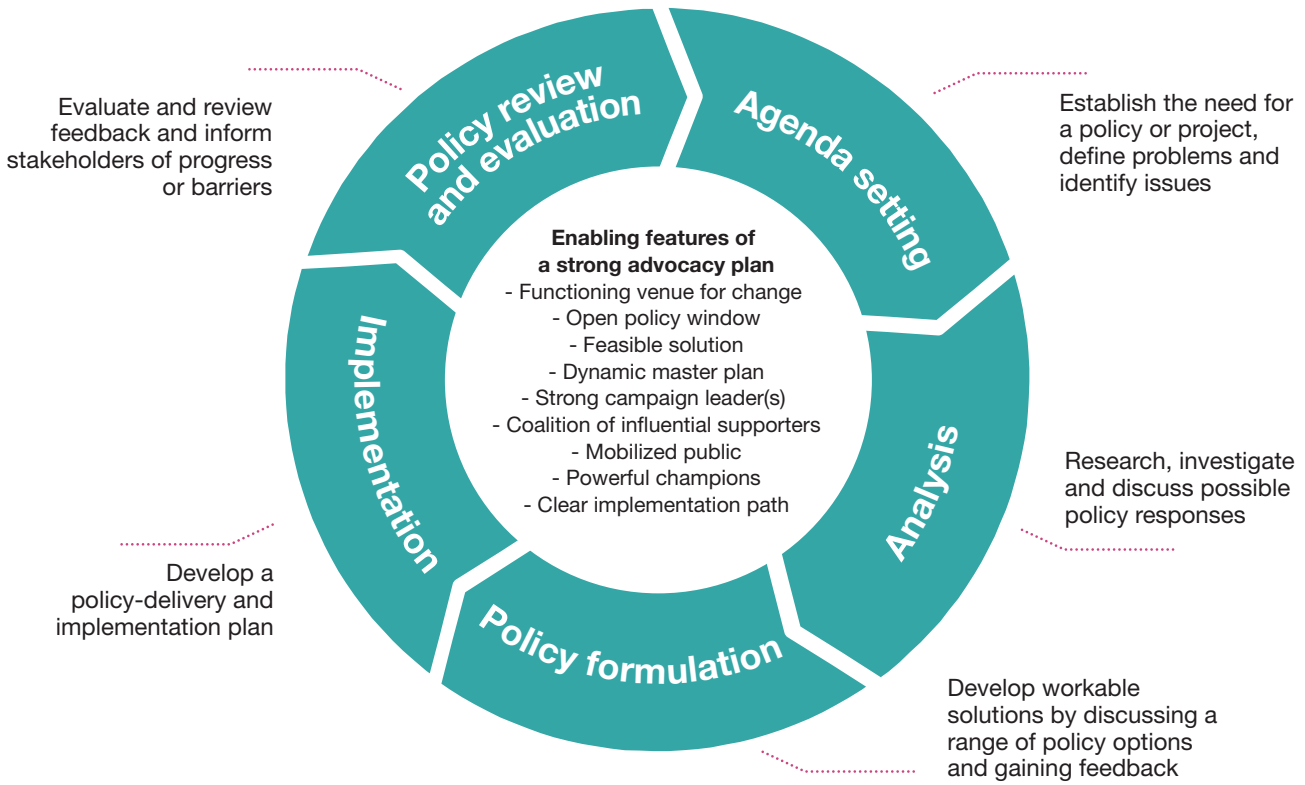
We studied four examples in which numerous stakeholders came together to address barriers and thereafter successfully developed and implemented policy change. The examples all relate to education but vary in policy content as well as setting: one case involves a central-government programme in South Korea; another, a public-private partnership in the US state of Illinois; a third, an NGO-led project in the developing country of Jamaica. In addition, we examined the inclusion of universal primary education as one of the United Nations Millennium Development Goals for a perspective on how variations affect a global campaign or policy.

We compared each example with the cycle-of-public-policy-change framework to arrive at recommendations for policy change involving SEL. We identified key SEL-related actions and stakeholders at each stage. And we formulated specific calls to actions that each stakeholder must address to achieve changes in the behaviours that promote SEL. The following is a summary of the four examples.

A central-government programme

South Korea is an example of a country whose centralized government drove change from the top. In the early 1990s, South Korean officials were determined to prepare students for the knowledge-based economy by focusing on developing creativity and critical-thinking skills. South Korea's Ministry of Education set the reform agenda, using international data and comparisons to underscore problems in the country's schools and economy. In the analysis phase, a government survey of students revealed low student engagement and found that students spent too many hours in after-school "cram schools" studying for university exams. Next, the government established the Presidential Commission on Education Reform to develop proposals, which included reducing the number of subjects that students were required to take and mandating the inclusion of "creative experiential learning activities". These policies were subsequently implemented and refined on the basis of feedback and measurement. Today, South Korean students rank first in creative problem-solving, according to the PISA international assessment.[39]

Stakeholders must adapt to the cycle of public policy change



Source: "Stakeholder Engagement Framework", Department of Education and Early Childhood Development, State Government of Victoria, Australia, http://www.education.vic.gov.au/Documents/about/programs/partnerships/stakeholderengagement11.pdf.

A public-private partnership in a decentralized system

In 1992, the state of Illinois undertook an early-childhood education initiative with the goal of changing policy to make high-quality preschool available for all three- and four-year-olds in the state. The initiative faced several barriers. The state had other priorities on its agenda (welfare reform in the 1990s and school reform before that), for instance, and it was crucial to provide evidence of the benefits of any such programme to galvanize constituent support. Stakeholders came together and analysed programmes and pilot experiments focused on early-childhood development. They formed education coalitions and struck partnerships with foundations, providers, families and businesses. Ultimately, the legislature established the Illinois Early Learning Council and asked it to design a system of early care and education. And the state's governor campaigned successfully on a preschool-for-all platform and pushed for the initiative. In 2006, the Preschool for All initiative established access to preschool for every three- and four-year-old child in Illinois.

An NGO-led project in a developing country

In Jamaica, the non-profit Jamaican Computer Society (JCS) began pushing in early 1989 for technology adoption in the classroom, exemplifying how a grass-roots organization can effect change in a developing country whose government may have more pressing needs and priorities and less capacity. The JCS sought to increase adoption of technology in schools to meet a growing demand for computer professionals. This was not a top priority of the government, posing one challenge, and the group needed to provide evidence of the benefits of its programme. The JCS met with teachers of computer science, identified constraints and formulated a strategy. It began to raise awareness by mounting exhibitions demonstrating the benefits of using computers in schools. It formed a foundation and solicited support from the community, schools, local businesses and global NGOs to raise money and awareness. The JCS ultimately launched a partnership involving the government, the private sector and secondary schools to provide training in schools, teachers' colleges and computer labs. By 2000, 102 of Jamaica's 166 secondary schools and tertiary institutions were equipped with computer labs, up from 10 a decade earlier.

A global campaign

In 2000, the UN launched a series of broad, long-term targets called the UN Millennium Development Goals, one of which was to achieve by 2015 universal primary education that provides an environment to promote effective learning. High costs, particularly for countries below the poverty line, and a shortage of classrooms to accommodate all students stood as formidable barriers. The UN established the Millennium Project, an advisory board of 250 experts. It also launched a campaign to inspire people around the world to take action towards this goal. The project presented an action plan and convened 170 heads of state in 2005. It also held a series of summits bringing together diverse stakeholders, including governments, businesses and foundations. The Millennium Development Goals collected commitments of $4.5 billion to fund education reforms. In 2015, 91% of all eligible students were enrolled in school in developing countries, up from 83% in 2000.

Stakeholders can promote the adoption of SEL

	Key stage to promote SEL				
Context	**Agenda setting**	**Analysis**	**Policy formulation**	**Implementation**	**Policy review and evaluation**
Developing countries	— **Bottom-up efforts** from NGOs and others to increase awareness and action for SEL — **Mobilized** business and key stakeholders	— **Community-driven solutions** from NGOs, the education community and parents	— **Response to needs** that emerge from partnerships with businesses and governments	— **Support from global organizations**, such as the World Bank — **Shared responsibilities and costs** among stakeholders — **Campaigns** to inspire action	— **Tracking and monitoring** of progress towards milestones for increased SEL awareness and action
Developed countries with decentralized education system	— **Strong evidence** from research or **pilots and programmes** showing benefits — **Champions**, such as education secretaries or state governors, with enough political clout to place SEL on the policy agenda	— **Cross-disciplinary expert panels,** including researchers, policy-makers and educators — **Translation and synthesis of research** for the public by think tanks, advocates and the media	— **All relevant stakeholders involved** in drafting solutions — **Government body** formed to design recommendations	— **Public and private funding** directed to SEL and to fill in gaps, such as SEL-related teacher qualifications — **Gradual change in laws and regulations** to support SEL, such as through curricula — **Media campaigns** to increase SEL awareness — **Product standards, ratings and reviews**	— **Integrated data systems to track progress and needs,** including different data sources inside and outside schools — **Embedded evaluations** in programmes and products for overall impact among subgroups
Developed countries with centralized education system	— **International and local data** to bring the issue to public attention — **Government-led** changes in education policy	— **Government-driven analysis and changes**, according to the tracking of data and results	— **Government-driven solutions**	— **More rapid change in curricula**, such as increased focus on SEL — **Additional rules to support policy changes**	— **International comparisons** and internal evaluations

Appendix 4: Methodology

We surveyed approximately 200 parents and 200 educators (including 190 teachers and 20 principals) in each of the following five countries: US, UK, South Korea, China and Kenya. Respondents were aware of the competencies and character qualities defined in our earlier report, *New Vision for Education: Unlocking the Potential of Technology*, and understood the role of technology in teaching these skills.

The survey examined how well parents and educators emphasized SEL practices and technology at home and in the classroom and how well they perceived the benefits and potential for SEL. In the US and the UK, parents and educators completed the survey online. In South Korea and China, parents took the survey online. All of the educators surveyed in South Korea responded through face-to-face interviews, while one-quarter of educators in China responded in person and the rest responded using online surveys. In Kenya, we collected all information from parents and educators via face-to-face surveys. The sample included primarily urban, middle-income residents from the countries in the survey. In Kenya, the survey was conducted in the key cities of Mombasa and Nairobi. In China, the survey was conducted in Shanghai and Beijing.

To identify features highly correlated with each of our 10 competencies and character qualities, we took the following steps:

- We first identified key technology-based learning elements from research into interactive media. We found the following nine elements to be conducive to learning[40]:
  - **Control:** Interactive technology allows player to influence game play, game environment and learning experience
  - **Teamwork with peers:** Interactive technology helps develop communication and collaboration skills
  - **Specific goals/rules:** Interactive technology has rules to follow and goals to attain; these rules and goals may be explicit or implicit
  - **Creation:** Interactive technology provides a broad understanding of how artefacts are created and how they function
  - **Customization:** Interactive technology is tailored to each learner's specific learning and playing styles
  - **Risk-taking and uncertainty:** Interactive technology should encourage learners to take risks, explore and try new things
  - **Active learning:** Interactive technology requires ongoing interaction between player and game
  - **Transfer of learning:** Interactive technology allows for application and reflection of actions and learning from interactive media in other contexts
  - **Ongoing feedback:** Interactive technology provides timely information to players about their performance
- Based on this research, we mapped technology features to these technology-based learning elements – so, for example, the technology feature "offer immediate feedback about performance" is linked to the element "ongoing feedback", and the technology feature "allow for writing notes and journal entries" is linked to the element "transfer of learning".
- We linked each feature to our competencies and character qualities based on our list of learning strategies.
- We validated our resulting list of features and their links to skills with professors at Carnegie Mellon University, Florida State University, Geneva University, the University of Malta and University of Leuven.

Acknowledgements

World Economic Forum Project Team

- **Mengyu Annie Luo**, Director, Head of Media, Entertainment and Information, Media, Entertainment & Information Industries
- **Jiaojiao Li**, Project Lead, Head of New Vision for Education, Media, Entertainment & Information Industries
- **Jessica Boccardo**, Project Manager, New Vision for Education, Media, Entertainment & Information Industries (on secondment from The Boston Consulting Group)

Project Advisers

- **Allison Bailey**, Senior Partner and Managing Director, The Boston Consulting Group
- **Elizabeth Kaufman**, Partner and Managing Director, The Boston Consulting Group

Steering Committee Members

- **Linda Abraham**, Co-founder, Comscore
- **Daphne Bavelier**, Professor, Faculty of Psychology and Educational Science and Geneva Neuroscience Center, University of Geneva
- **Melina Bellows**, Chief Education Officer, National Geographic Society
- **Irene Braam**, Vice-President, Government Relations, and Head, Brussels Liaison Office, Bertelsmann
- **Justine Cassell**, Associate Dean, Technology Strategy and Impact, School of Computer Science, Carnegie Mellon University
- **Borhene Chakroun**, Chief of Section, Youth Literacy and Skills Development, United Nations Educational, Scientific and Cultural Organization (UNESCO)
- **Elizabeth Daley**, Dean, School of Cinematic Arts, University of Southern California (USC)
- **Marcos V. de Souza,** Secretary of Innovation, Ministry of Development, Industry and Foreign Trade, Brazil
- **Jose Ferreira**, Founder and CEO, Knewton
- **Ben Forta**, Senior Director of Education Initiatives, Adobe
- **Lisa Foster**, Head, Policy Programs, Global Public Policy, Facebook
- **Amanda Gardiner**, Vice-President, Sustainability & Social Innovation, Pearson
- **Peggy Johnson**, Executive Vice-President, Business Development, Microsoft
- **Andrew Kvaal**, Senior Vice-President of Technology Strategy and Operations, Cengage
- **Shannon May**, Co-founder and Chief Development Officer, Bridge International Academies
- **Vikas Pota**, Chief Executive Officer, Varkey Foundation
- **Martina A. Roth**, Senior Director, Global Education, Strategy Research and Policy, Corporate Affairs Group, Intel
- **Andreas Schleicher**, Head, Indicators and Analysis Division, Programme for International Student Assessment (PISA), Organization for Economic Co-operation and Development (OECD)
- **Michael Gus Schmedlen**, Vice-President, Worldwide Education, HP Inc.
- **Zach Sims**, CEO and Co-founder, Codeacademy
- **Justin van Fleet**, Chief of Staff to Rt. Honourable Gordon Brown, UN Special Envoy for Global Education
- **Lance Weiler**, Director of Experiential Learning and Applied Creativity, Columbia University

Interviewees

- **Marina U. Bers**, Professor, Eliot-Pearson Department of Child Study and Human Development, Department of Computer Science Director, DevTech Research Group, Tufts University
- **Ian Chiu**, Principal, Warburg Pincus
- **Christopher Dede**, Timothy E. Wirth Professor in Learning Technologies, Harvard Graduate School of Education
- **Matthew Dunleavy**, Assistant Professor, Radford University
- **Howard Gardner**, Professor of Cognition and Education, Harvard Graduate School of Education
- **Jessica Hammer**, Assistant Professor, Human-Computer Interaction Institute and the Entertainment Technology Center, Carnegie Mellon University
- **Rilla Khaled**, Assistant Professor, Institute of Digital Games, University of Malta
- **Eric Klopfer**, Professor and Director, MIT Scheller Teacher Education Program
- **Michael H. Levine**, Founding Director, Joan Ganz Cooney Center
- **Koji Miyamoto**, Economist, Centre for Educational Research and Innovation, OECD
- **David Perkins**, Research Professor of Teaching and Learning, Harvard Graduate School of Education
- **Fernando M. Reimers**, Ford Foundation Professor of Practice in International Education, Harvard Graduate School of Education
- **Dan Schwartz**, Dean, Stanford Graduate School of Education
- **Valerie Shute**, Mack and Effie Campbell Tyner Endowed Professor of Education, Educational Psychology, Learning Systems Department, Florida State University

In addition to the list above, we would also like to thank the people who spoke to us during our project interviews, as well as the teams at the World Economic Forum, The Boston Consulting Group, the Committee for Children and our other partner companies that supported the project with research, feedback and advice. Special thanks to Mickey Butts, Senior Writer at The Boston Consulting Group, and Catherine Cuddihee, Senior Editor at The Boston Consulting Group, for their assistance in preparing this report. We also thank Adam Levy and Cliff Chestnut for their writing support.

Endnotes

1 Many stakeholders follow the approach of the Collaborative for Academic, Social and Emotional Learning, which defines SEL as including five competency sets (self-awareness, self-management, social awareness, relationship skills and responsible decision-making).

2 Deming, David J., *The Growing Importance of Social Skills in the Labor Market,* Harvard University and NBER, August 2015, http://scholar.harvard.edu/files/ddeming/files/deming_socialskills_august2015.pdf.

3 Davidson, Cathy N., *Now You See It: How Technology and Brain Science Will Transform Schools and Business for the 21st Century,* Penguin Books, 2013.

4 Levy, Frank and Murnane, Richard J., *Dancing with Robots: Human Skills for Computerized Work,* Third Way, 2013, http://content.thirdway.org/publications/714/Dancing-With-Robots.pdf.

5 Ibid.

6 Garvin, David A., "How Google Sold Its Engineers on Management", *Harvard Business Review*, December 2013, https://hbr.org/2013/12/how-google-sold-its-engineers-on-management.

7 Durlak, Joseph A., et al., "The Impact of Enhancing Students' Social and Emotional Learning: A Meta-Analysis of School-Based Universal Interventions", *Child Development*, January/February 2011, Volume 82, http://onlinelibrary.wiley.com/doi/10.1111/j.1467-8624.2010.01536.x/abstract.

8 Schweinhart, Lawrence J., "Benefits, Costs, and Explanation of the High/Scope Perry Preschool Program", High/Scope Educational Research Foundation, April 26, 2003, http://www.highscope.org/file/Research/PerryProject/Perry-SRCD_2003.pdf.

9 HighScope, "Lifetime Effects: The HighScope Perry Preschool Study Through Age 40", 2005, http://www.highscope.org/content.asp?contentid=219.

10 OECD, "Skills for Social Progress: The Power of Social and Emotional Skills", 2015, http://www.oecd.org/edu/ceri/skills-for-social-progress-key-messages.pdf.

11 Belfield, Clive, et al., *The Economic Value of Social and Emotional Learning*, Center for Benefit-Cost Studies in Education, Teachers College, Columbia University, February 2015, http://blogs.edweek.org/edweek/rulesforengagement/SEL-Revised.pdf.

12 International Rescue Committee, Healing Classrooms Initiative brochure, http://www.rescue.org/sites/default/files/migrated/resources/irc_healingclassrooms-brochure.pdf.

13 For example, Jeffrey, Bob and Anna Craft, "Teaching Creatively and Teaching for Creativity: Distinctions and Relationships", *Educational Studies*, vol. 30, no. 1), 2004, pp. 77–87, http://oro.open.ac.uk/425/2/CT-TFC-Final-Ed_Studies.pdf.

14 Johnson, D.W., and R.T. Johnson, "An Educational Psychology Success Story. Social Interdependence Theory and Cooperative Learning", *Educational Researcher,* vol. 38, no. 5, 2009, pp. 365-379. https://www.researchgate.net/publication/249016790_From_Interaction_to_Intersubjectivity_Facilitating_online_group_discourse_processes.

15 Brindley, Jane E., Christine Walti and Lisa M. Blaschke, "Creating Effective Collaborative Learning Groups in an Online Environment", *The International Review of Research in Open and Distributed Learning*, June 2009, http://www.irrodl.org/index.php/irrodl/article/view/675/1271.

16 Henderson, Anne T., and Karen L. Mapp, *A New Wave of Evidence: The Impact of School, Family, and Community Connections on Student Achievement,* National Center for Family and Community Connections with Schools, Southwest Educational Development Laboratory, 2002, https://www.sedl.org/connections/resources/evidence.pdf.

17 Durlak, Joseph A., Roger P. Weissberg and Molly Pachan, "A Meta-Analysis of After-School Programs That Seek to Promote Personal and Social Skills in Children and Adolescents", *American Journal of Community Psychology,* vol. 45, March 2010, pp. 294-309, http://www.flume.com.br/pdf/Durlak_A_meta-analysisof_after_school.pdf.

18 Miller, Beth M., *Critical Hours: Afterschool Programs and Educational Success,* Nellie Mae Education Foundation, May 2003, https://www.nmefoundation.org/getmedia/08b6e87b-69ff-4865-b44e-ad42f2596381/Critical-Hours?ext=.pdf.

19 *Education Technology (Ed Tech) and Smart Classrooms Market by Hardware, Systems, Technologies—Global Forecast to 2020,* MarketsandMarkets, 2015.

20 Kawashima-Ginsberg, Kei, *Summary of Findings from the Evaluation of iCivics' Drafting Board Intervention,* The Center for Information & Research on Civic Learning & Engagement (CIRCLE), December 2012, http://www.civicyouth.org/wp-content/uploads/2012/12/WP_76_KawashimaGinsberg.pdf.

21 Squire, Kurt, *Video Games and Learning: Teaching and Participatory Culture in the Digital Age*, Teachers College Press, May 2011.

22 Thompson, Clive, "How Videogames Like *Minecraft* Actually Help Kids Learn to Read", *Wired,* October 9, 2014, http://www.wired.com/2014/10/video-game-literacy/.

23 Cipollone, Maria, Catherine C. Schifter and Rick A. Moffat, "Minecraft as a Creative Tool: A Case Study", *International Journal of Game-Based Learning*, vol. 4, no. 2, April 2014, pp. 1-14.

24 Squire, Kurt, "Cultural Framing of Computer/Video Games", *The International Journal of Computer Game Research,* vol. 2, no. 1, July 2002, http://www.gamestudies.org/0102/squire/.

25 Lederman, L.C., and K. Fumitoshi, K., "Debriefing the Debriefing Process: A New Look", in Crookall, D., and K. Arai (eds.), *Simulation and Gaming Across Disciplines and Cultures*, Sage Publications, 1995.

26 Dede, Chris, "The Role of Digital Technologies in Deeper Learning", Students at the Center: Deeper Learning Research Series, Jobs for the Future, 2014.

27 Wingfield, Nick, "In Virtual Reality Headsets, Investors Glimpse the Future", *The New York Times*, December 13, 2015, http://www.nytimes.com/2015/12/14/technology/in-virtual-reality-headsets-investors-glimpse-the-future.html.

28 DeWitt, Jennifer, and Martin Storksdieck, "A Short Review of School Field Trips: Key Findings from the Past and Implications for the Future", *Visitor Studies,* vol. 11, no. 2, 2008, pp. 181-197. http://www.uio.no/studier/emner/uv/iped/PED4540/h14/pensumliste/a-short-review-of-school-field-trips-key.pdf

29 Bridgeland, John, Mary Bruce and Arya Hariharan, *The Missing Piece: A National Teacher Survey on How Social and Emotional Learning Can Empower Children and Transform Schools,* CASEL/Civic Enterprises, 2013, http://static1.squarespace.com/static/513f79f9e4b05ce7b70e9673/t/526a2589e4b01768fee91a6a/1382688137983/the-missing-piece.pdf.

30 Schonert-Reichl, Kim and Vicki Zakrzewski, "How to Close the Social-Emotional Gap in Teacher Training", *Greater Good*, January 8, 2014, http://greatergood.berkeley.edu/article/item/how_to_close_the_social_emotional_gap_in_teacher_training.

31 Brackett, Marc A., and Susan E. Rivers, *Transforming Students' Lives with Social and Emotional Learning,* Yale Center for Emotional Intelligence, Yale University, 2013, http://ei.yale.edu/wp-content/uploads/2013/09/Transforming-Students%E2%80%99-Lives-with-Social-and-Emotional-Learning.pdf.

32 Bridgeland, John, Mary Bruce and Arya Hariharan, op. cit.

33 Martens, K., et al., eds., *Transformation of Education Policy,* Palgrave Macmillan UK, 2010.

34 Fazekas, Mihály, and Tracey Burns, "Exploring the Complex Interaction Between Governance and Knowledge in Education", *OECD Education Working Papers*, No. 67, OECD Publishing, 2012.

35 United Nations Sustainable Development Knowledge Platform, https://sustainabledevelopment.un.org/sdg4.

36 OECD, *Skills for Social Progress*, March 10, 2015, http://www.oecd.org/edu/skills-for-social-progress-9789264226159-en.htm.

37 OECD, "Steering Education Systems", in *Education Policy Outlook 2015: Making Reforms Happen,* OECD Publishing, 2015.

38 For example, Anderson, Linda Ackerman and Dean Anderson, *The Change Leader's Roadmap: How to Navigate Your Organization's Transformation*, 2nd Edition, Pfeiffer, 2010; Smith, Kevin B. and Christopher W. Larimer, *The Public Policy Theory Primer,* Second Edition, Westview Press, 2013; Brewer, Garry D. and Peter DeLeon, *The Foundations of Policy Analysis*, Brooks/Cole Publishing Company, 1983.

39 OECD, *PISA 2012 Results: Creative Problem Solving: Students' Skills in Tackling Real-Life Problems (Volume V),* PISA, OECD Publishing, 2014, http://www.oecd.org/pisa/keyfindings/PISA-2012-results-volume-V.pdf.

40 There is growing research on the links between interactive technology and learning. See for example, Gee J.P., "Good Video Games and Good Learning", *Collected Essays on Video Games, Learning and Literacy* (2nd edition), 2013; Moeller, B., and T. Rietzes, "Integrating Technology with Student-Centered Learning", Education Development Center Inc. Nellie Mae Education Foundation*,* 2011; Novak, E., et al., "Effects of an Instructional Gaming Characteristic on Learning Effectiveness, Efficiency, and Engagement: Using a Storyline for Teaching Basic Statistical Skills", *Interactive Learning Environments,* 2014; Richard, John, et al., "Games for a Digital Age: K-12 Market Map and Investment Analysis", The Joan Ganz Cooney Center at Sesame Workshop, 2013; *Staalduinen*, J.P., and S. de Freitas, "A Game-Based Learning Framework*:* Linking Game Design and Learning", Learning to Play: Exploring the Future of Education with Video Games, 2011.

WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation.

The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas.

World Economic Forum
91–93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel.: +41 (0) 22 869 1212
Fax: +41 (0) 22 786 2744
contact@weforum.org
www.weforum.org