Chapter 1 21st Century Education for Student Success and Economic Development

Chapter Introduction by Andreas Schleicher

Deputy Director for Education and Skills
Special Advisor on Education Policy to the Secretary-General
Organization for Economic Development and Opportunity (OECD)
@SchleicherEdu

"It is critically important to attract good teachers, support and encourage their professionalism, continue to invest in them, and align assessment and rewards to support innovation in teaching."

In a fast-changing, interconnected world, education must change to prepare students for success in life. The modern global economy doesn't pay you for what you know, because the Internet knows everything. The world economy pays you for what you can do with what you know.

Nations that want a knowledge economy are investing to produce students who can intelligently manage and evaluate information and data. They are moving beyond asking whether students can reproduce what they learned in school. They want to know how creatively they can use what they know, and whether they can extrapolate from it and apply their knowledge in another context. Skills such as critical thinking, creativity, problem solving, and collaboration are at an increasing premium.

Since the first Program for International Student Assessment (PISA) study in 2000, we have come a long way in stimulating discussions about how to improve student performance and equity. We see that successful nations and school systems set high expectations for all students. They embrace diversity, and provide a high degree of support for each student. They understand that students learn differently, and really engage with that. Modern learning can no longer be about a one-size-fits-all system but about personalizing learning approaches.

This requires a very different learning environment, a very different kind of work organization, and a very, very different caliber of teachers. It is critically important to attract good teachers, support and encourage their professionalism, continue to invest in them, and align assessment and rewards to support innovation in teaching.

Technology has to be an integral part of the process. Technology allows us to embrace teaching and assessment of entirely new skills that are very important for the 21st century and that you cannot develop in a kind of traditional environment. But technology has to work through teachers. Technology can leverage great teaching enormously. But great technology doesn't replace poor teaching. The challenge is to bring technology into the picture in ways that translate into good teaching and learning. This requires sophisticated public policy, a long-term commitment, and a systematic approach.

For school systems, the benchmark for success is no longer to be better than you were last year, but to measure up against the best performing systems in the world. The potential rewards are tremendous. Even modest improvements in student performance can produce hundreds of trillions of dollars over the lifetime of a cohort of students. Civic engagement and volunteerism also depend closely on the skills of citizens.

In today's global economy, the consequences for not making progress are increasingly consequential. In the past, if you had low levels of skills, you could still get a decent job with a decent wage. Today, that's no longer possible. You end up in a race to the bottom. The people at the high end of the skill distribution, on the other hand, have seen dramatically improved wages. The cost of low education performance is very, very high, and the consequences of inequalities in educational outcomes are dramatically widening.

Andreas Schleicher

Andreas Schleicher is an education visionary, researcher, and statistician who chairs the OECD Program for International Student Assessment. He holds an M.S. in Mathematics from Deakin University, and was named an Honorary Professor in the Faculty of Behavioral and Cultural Studies by the University of Heidelberg.

Starting from a Vision of Student Success

Learning-focused educational technology initiatives start from a clear vision of the intended goals and an understanding of how powerful mobile devices and other information and communication technology (ICT) can help schools achieve them. This chapter provides an overview of:

- What students need to thrive as next-generation citizens and innovators and achieve their full potential
- How student-centered models of learning help meet those needs
- How educational technologies can empower students and teachers for success
- Potential goals and impacts for transformative educational technology initiatives

Subsequent chapters present a holistic model to guide a learning-focused educational technology initiative, including best practices and examples of successful initiatives.

Thriving in a Changing World

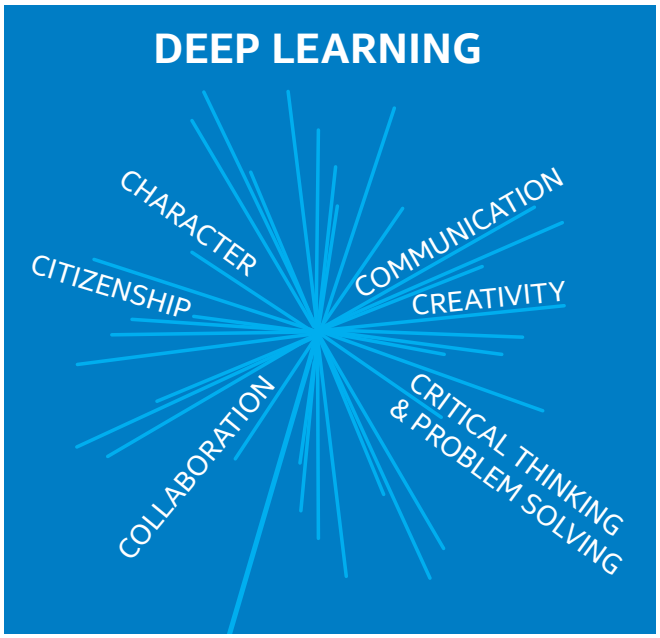
Today's students will live in a rapidly changing world with opportunities and challenges that are very different from the ones many of us grew up with. To fulfill their human potential and lead their communities and economies, students must not only master a foundation of facts and concepts, but also be able to apply, extend, and expand on that knowledge. They must develop 21st century, transversal skills that enable them to:

- Work independently as self-driven, life-long learners and innovators
- Work collaboratively and respect diverse viewpoints
- Think critically about new challenges
- Apply their knowledge in novel situations to solve new problems
- Communicate via a range of technologies and methods
- Work persistently in the face of difficult challenges

In addition to raising achievement, policymakers increasingly recognize that they have a moral as well as a practical imperative to increase equity and improve success for all students. In a closely connected, knowledge-driven world, each school, community, state, municipality, province, and nation benefits by raising student outcomes for every learner—and no society can excel if it writes off a large part of its populace.

The New Pedagogies for Deep Learning Global Partnership, a consortium founded by Intel and other organizations committed to equipping students for success, offers a framework that aligns with these goals and requirements. Writing for the partnership, Michael Fullan and Maria Langworthy emphasize the need to "prepare all learners to be life-long, creative, connected and collaborative problem solvers and to be healthy, happy individuals who contribute to the common good in today's globally interdependent world. We need our learning systems to encourage youth to develop their own visions about what it means to connect and flourish in their constantly emerging world, and equip them with the skills to pursue those visions."[1] In *Great to Excellent*, Fullan highlights six skills that provide a foundation for deep learning for every student[2]:

- **Character education.** Personal traits and attributes such as responsibility, perseverance, and empathy
- **Citizenship.** Knowledge of global issues, respect for other cultures, involvement in sustaining humanity and the environment
- **Communication.** The ability to communicate effectively and actively listen to others
- **Critical thinking and problem solving.** The ability to think critically to solve problems, make effective decisions, and design and manage projects
- **Collaboration.** The ability to work in teams, learn from and contribute to others' learning, and collaborate with diverse individuals
- **Creativity and imagination.** The ability to consider and pursue novel ideas, lead others, undertake economic and social entrepreneurial activities



Transforming Schools to Match 21st Century Needs

How can schools, parents, and societies empower students to develop these skills and abilities? While the details of the answers may vary depending on local requirements, there is broad agreement that yesterday's lecture-centric, one-size-fits-all approach cannot prepare students for today's challenges, let alone those that will emerge in their lifetimes.

Instead, the traditional model, which developed out of the factory-era framework of the 19th century, is shifting to a modern model of personalized, student-centered learning. This new model reflects the needs and circumstances of 21st century students and societies. It encompasses the new science of learning and learning styles,

and takes advantage of all that ICT can contribute to learning and teaching—from mobile devices for students and teachers, to adaptive curriculum resources that give students and teachers instant information on the learner's progress. The student-centric model better empowers all learners to reach their fullest potential. It positions students and their societies to thrive in a knowledge-based global economy and a complex world.

OECD refers to successful learner-centric schools as innovative learning environments, and says they share seven important traits.[3] Innovative learning environments:

1. Make learning and engagement central
2. Ensure that learning is social and often collaborative
3. Are attuned to learner motivations and emotions
4. Are acutely sensitive to individual differences
5. Are demanding for all learners but without excessive overload
6. Use assessments consistent with learning aims, with a strong emphasis on formative feedback
7. Promote connectedness across subjects and subjects, in and out of school

Teachers and Technology

ICT is a direct and profound enabler for transformed learning environments—but teachers, and the deep personal relationships they create with their students, remain the foundation for learning. However, teachers take on new roles as facilitators and guides who activate each student's unique learning path. Supported by effective policies, professional learning, and digital curriculum, teachers gain unprecedented tools and information to customize the student's learning experience and deliver an academically rigorous education that emphasizes inquiry, investigation, independent learning, and collaboration.

Guided by highly skilled teachers, students in a transformed environment use powerful mobile devices as personal learning platforms. Accessing a wealth of digital learning resources and following modern pedagogic strategies, students can:

- Manage their time and take more control of their learning
- Engage with the world and access different mediums for learning in ways that fit their individual needs, excite their passions, and improve outcomes
- Explore and analyze vibrant, interactive learning resources throughout the school day and beyond
- Interact with materials that bring abstract concepts to life and tailor the presentation of content to each learner's needs
- Use a wide range of creative methods to demonstrate what they're learning
- Create and publish unique content, taking ownership of their ideas and engaging in meaningful social learning

In addition to direct support for student learning, ICT provides valuable tools and data for creating a more transparent, evidence-based culture. Teachers can use data from formative assessments to identify learning problems and intervene in real time to optimize outcomes. School performance management systems, human capital management systems, and other solutions provide a firmer basis to identify effective strategies and make evidence-based decisions on resource allocation and program management. ICT also provides cost-effective tools to help increase collaboration, and build trust and community through transparent communications.

As it has in other areas of the economy and society, ICT in education can increase efficiency and provide new ways to work. Teachers can reduce isolation and share best practices through online communities of practices and self-paced professional learning. Digital tools can offer efficient ways to organize and manage courses, content, assessments, grades, and other data. Digital learning resources can reduce the costs of textbooks while offering access to more timely content.

UNESCO is one of many organizations that recognizes ICT and teachers as central to education reform, economic growth, and social development. The UNESCO ICT Competency Framework for Teachers (ICT-CFT) identifies six important areas where education must advance in order to create knowledge-based societies that can reduce poverty and inequity, advance standards of living, and prepare students for the challenges of the 21st century. The UNESCO framework (Table 1.1) envisions ICT-enabled education transformation as a process that moves through three stages:

- Technology literacy: Students use ICT to learn more efficiently
- Knowledge deepening: Students use ICT to apply their knowledge to complex, real-world problems
- Knowledge creation: Students and their societies "create the new knowledge required for more harmonious, fulfilling and prosperous societies"[4]

Evolving Education to Create a Knowledge Economy: The UNESCO ICT Competency Framework

	Technology Literacy	Knowledge Deepening	Knowledge Creation
Understanding ICT in Education	Policy awareness	Policy understanding	Policy innovation
Curriculum and Assessment	Basic knowledge	Knowledge application	Knowledge society skills
Pedagogy	Integrate technology	Complex problem solving	Self management
ICT	Basic tools	Complex tools	Pervasive tools
Organization and Administration	Standard classroom	Collaborative groups	Learning organizations
Teacher Professional Literacy	Digital literacy	Manage and guide	Teacher as model learner

Table 1-1

OECD recognizes digital resources and platforms as essential enablers for innovative learning environments. OECD says ICT can help teachers transform the learning environment by[5]:

- Engaging learners and facilitating student-directed learning
- Facilitating collaboration and joint learning
- Facilitating differentiated and personalized learning
- Bringing in excluded learners or connecting learners who would otherwise not be included
- Redefining "educators," enabling online tutors, experts, or teachers from other schools to serve as teachers
- Opening access to content resources that were previously unavailable
- Supporting virtual learning spaces and eliminating the idea that education occurs at a set time and place with a fixed set of students
- Building distributed leadership and transparency through ICT-based communication and collaboration
- Improving teacher learning through online materials, collaborative learning communities, and social media
- Building capacity through partnerships

Establishing Goals: What Can We Achieve?

Governments and educators at every level are investing in education transformation and educational technology to enhance innovation, advance a knowledge economy, reduce poverty, and increase equity.[6] They are seeking results that can include a growing economy, rising standard of living, expanding tax base, and more active citizens. The European Union has established long-term strategic objectives for education policies[7]:

- Make lifelong learning and mobility a reality
- Improve the quality and efficiency of education
- Promote equity, social cohesion, and active citizenship
- Enhance creativity, innovation, and entrepreneurship

Learning-focused educational technology initiatives can produce impacts that support these goals and extend well beyond higher test scores. Establishing clear goals early in the initiative is an essential step toward creating an educational technology initiative that will achieve important objectives. The following are examples of goals that may be relevant to your initiative. Chapter 3 provides additional information on goal setting, and Chapter 9 discusses evidence-based ways to determine how well your initiative achieves its goals.

Achievement

- Raise levels of achievement on standards-based assessments, particularly in reading and in science, technology, engineering, mathematics (STEM), and other areas that are critical to economic progress
- Enable students to demonstrate higher levels of critical thinking, analysis, communication, and other 21st century, transversal skills
- Increase graduation rates

Equity

- Offer more equitable access to high-quality resources across regions and genders
- Increase the number of girls enrolled in school
- Increase the number of girls taking STEM classes
- Bridge the digital divide and provide equal access to technology across socio-economic barriers
- Reduce the achievement gaps between highest and lowest performing students

School culture

- Increase levels of student engagement
- Increase attendance
- Reduce behavior problems
- Improve communication and collaboration with parents
- Increase teacher satisfaction

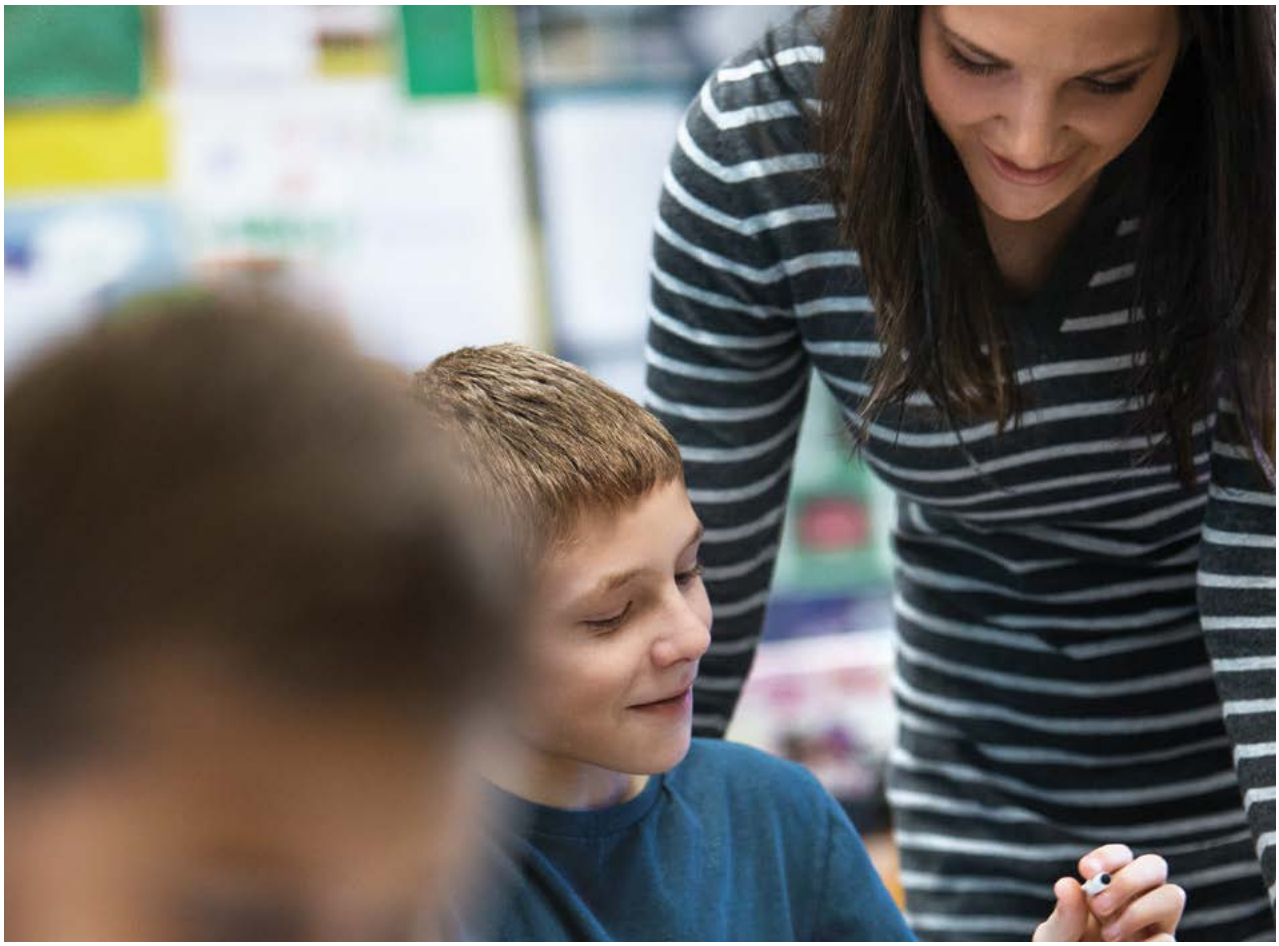
Societal impact

- Increase alignment with workforce needs, including an increase in entrepreneurial skills and skills that drive innovation and new job development for the knowledge economy
- Increase female participation and achievement in society
- Increase active citizenship and lifelong learning
- Foster cross-cultural understanding

Large-Scale Impacts

Achieving the goals of a transformative educational technology initiative can help advance both individual and national success. Analysis sponsored by OECD[8] shows that even small increases in student achievement can have large-scale, long-term economic impacts. Conducting economic modeling and using PISA scores as a measure of cognitive skills, the OECD-sponsored study found that raising the PISA scores of students in OECD nations by 25 points could increase the aggregate gross domestic product (GDP) of OECD nations of USD 115 trillion over the lifetime of the children born in 2010. Bringing all students in OECD nations up to a minimum skill level of 400 PISA points could generate aggregate GDP increases of nearly USD 200 trillion.

Successful educational technology initiatives can also help expand graduates' employment opportunities, counteract high rates of youth unemployment, and meet the rising need for advanced skills. By 2020, 20 percent more jobs will require higher level skills, according to the European Commission. The EC's report, *Rethinking Education*, calls for modernizing education in ways that provide greater flexibility and take advantage of ICT: "Education and training can only contribute to growth and job-creation if learning is focused on the knowledge, skills, and competencies to be acquired by students (learning outcomes) through the learning process, rather than on completing a specific stage or on time spent in school. ...The digital revolution brings important opportunities for education. It is time to scale up the use of ICT in teaching and learning."[9]



CASE STUDY

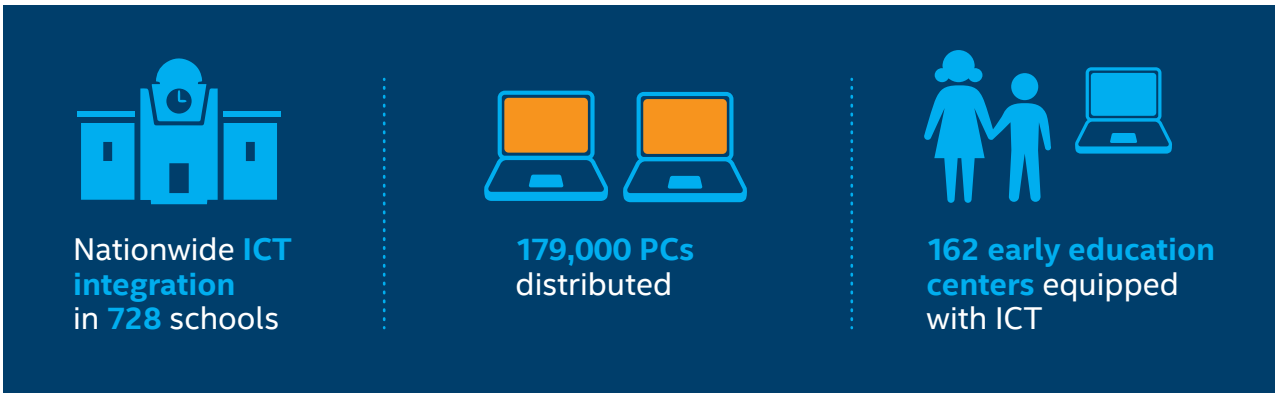
Holistic, Policy-Based Approaches to Education Transformation in Peru and Panama

Educational technology initiatives are an effective way to support and extend broader efforts to increase economic development.

The **regional government of Callao, Peru,** is investing in educational technology as part of a broader program to establish Callao as a digital city. Peru's leading port city, Callao uses ICT, including a wireless metropolitan network, to improve learning and teaching, as well as to enhance citizen access to government, healthcare, higher education, police and fire stations, and other services. Peru is providing mobile devices and learning resources, establishing in-school infrastructure, and delivering professional learning to nearly 30,000 educators. Among the innovative aspects of the Callao initiative, an EduCallao educational portal is open to the general public and offers access to thousands of learning resources—from a free online tutorial on ICT basics, to virtual courses.

The **Republic of Panama** is taking a comprehensive approach to transforming digital literacy and economic development through its Balboa Project, a nationwide rollout of digital learning resources in 728 schools. Panama's Ministry of Education is deploying mobile devices and network infrastructure and establishing services to enhance teachers' professional learning in the use of ICT for learning and teaching. The Balboa Project began with the approval of a national government initiative whose goals include:

- Contribute to greater educational equity among students
- Improve digital literacy
- Provide students with computers for daily use in the development of their schoolwork
- Expand the opportunities for students to access information
- Contribute directly to local household economies



Citations

1 Michael Fullan and Maria Langworthy, *Towards a New End: New Pedagogies for Deep Learning*, Collaborative Impact, 2013. http://www.newpedagogies.info/wp-content/uploads/2014/01/New_Pedagogies_for_Deep%20Learning_Whitepaper.pdf

2 Michael Fullan, *Great to Excellent: Launching the Next Stage of Ontario's Education Agenda*, 2013. http://www.michaelfullan.ca/wp-content/uploads/2013/09/13_Fullan_Great-to-Excellent.pdf

3 OECD, *Innovative Learning Environments*, Educational Research and Innovation, OECD Publishing, 2013. http://dx.doi.org/10.1787/9789264203488-en.

4 UNESCO *ICT Competency Framework for Teachers Version 2.0*, 2011. http://www.unesco.org/new/en/unesco/themes/icts/teacher-education/unesco-ict-competency-framework-for-teachers/

5 OECD, *Innovative Learning Environments*, Chapter 8: Creating and Sustaining Innovative Learning.

6 See *UN System Task Team on the Post-2015 UN Development Agenda: Education and Skills for Inclusive and Sustainable Development Beyond 2015, Thematic Think Piece*, May 2012. http://www.un.org/millenniumgoals/pdf/Think%20Pieces/4_education.pdf

7 See *Europa Summaries of EU Legislation, Education and Training 2020*. http://europa.eu/legislation_summaries/education_training_youth/general_framework/ef0016_en.htm

8 OECD: Programme for International Student Assessment. *The High Cost of Low Educational Performance: The Long-Run Economic Impact of Improving PISA Outcomes, 2010*. http://www.oecd.org/pisa/44417824.pdf

9 European Commission, *Rethinking Education: Investing in Skills for Better Socio-Economic Outcomes, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions*, 2012.

Resources

- Project RED provides a wide range of resources and research reports for school leaders. See *The Technology Factor: Nine Keys to Student Achievement and Cost-Effectiveness*, MDR 2010, at http://www.pearsonfoundation.org/great-learning/research-reports-and-surveys/project-red-the-technology-factor.html. Additional resources are at: http://www.projectred.org/
- Robert J. Marzano, Timothy Waters, Brian A. McNulty; *School Leadership that Works: From Research to Results*, ASCD and McREL, 2005
- New Pedagogies for Deep Learning. http://www.newpedagogies.info/
- OECD: The High Cost of Low Education Performance, 2010. http://www.oecd-ilibrary.org/education/the-high-cost-of-low-educational-performance_9789264077485-en
- OECD Innovative Learning Environments Project: http://www.oecd.org/edu/ceri/innovativelearningenvironments.htm
- OECD provides comparable data on education strategies and results around the world: http://gpseducation.oecd.org/Home
- UNESCO ICT *Competency Framework for Teachers* Version 2.0, 2011, and other resources: http://www.unesco.org/new/en/unesco/themes/icts/teacher-education/unesco-ict-competency-framework-for-teachers/