Technology helps people develop the critical skills needed to succeed in the knowledge economy

Every nation wants to position its economic opportunities advantageously in today's competitive global marketplace. Achieving that goal starts with developing the strongest, best-equipped workforce. Only in this way can we hope to nurture and support the development of the next generation of innovative businesses that a vital economy requires.

It is widely understood that when the population's skills are out of step with current and emerging needs, both people and societies lose. Such citizens are not positioned to fill the jobs—from doctors and scientists, to teachers and engineers—most needed in the dynamic, rapidly changing knowledge economy. We forfeit the potential contributions, both economically and otherwise, those people would have made to the wider culture.

The global employment crisis

- Almost 202 million people were unemployed in 2013, an increase of almost 5 million from 2012.¹
- The youth unemployment rate has reached 13.1 percent, which is almost three times as high as the adult unemployment rate and is a historical peak.¹
- Some 75 million young people were unemployed in 2012.²
- Youth make up 40 percent of the world's unemployed.³
- Young people are three times more likely than their parents to be out of work.²
- In Greece, Spain, and South Africa, more than half are unemployed.²
- Jobless rates of 25 percent or more are common in Europe, the Middle East, and North Africa.²
- In Europe, youth unemployment has doubled or even tripled the rate of general unemployment for the last two decades.⁴
- The U.S. alone forecasts a loss in wages of approximately $20 billion due to high youth unemployment.³
- By 2020, it is estimated that there will be a shortfall of 85 million high- and middle-skilled workers.²
**A GLOBAL FOCUS: 15- TO 24-YEAR-OLDS**

This age group represents:
- The biggest unemployment crisis as they are just starting their working lives
- One-sixth of the current world population
- The most dynamic sector of society, yet the most vulnerable and powerless
- One-tenth of the functionally illiterate

Technology-based innovation is needed at every stage of this age group’s journey to economic empowerment, including:
- Engagement
- Education
- Employability
- Entrepreneurship
- Economic growth
Narrowing the skills gap to drive employability

Opportunities for improving workforce preparedness include addressing today’s underlying skills gap. In a recent McKinsey study, for example, nearly 40 percent of employers claimed a lack of skills as the principal reason for entry-level vacancies. Approximately 27 percent reported leaving a job open in the past year due to a shortage of candidates with the necessary skills. Only 43 percent believe they can find enough entry-level skilled workers.

Readying students also means preparing teachers. In Europe, 74 percent of education providers were confident that their graduates were prepared for work, but in a telling departure only 38 percent of youth and 35 percent of employers agreed. And while the McKinsey survey concentrated on youth in the E.U., similar issues plague older age groups and other regions, including the U.S.

The ratio of older/inactive person to worker is expected to double from 38 percent in 2000 to 70 percent in 2050, according to the Organisation for Economic Co-operation and Development (OECD), putting a significant strain on a nation’s economy. Meanwhile, the income gap continues to widen, with the earnings of the top 10 percent now nine times higher than the bottom 10 percent, a 30-year high.

In the face of such a situation, how do we help ensure that those currently unable to find work are empowered to do so? How do we equip them with the tools they need to achieve the economic security, opportunity, and dignity they deserve? And how do we do it in a way that also advances the communities and countries in which they live?

These questions are driving a diverse set of organizations from governments and development agencies to nonprofits and multinational corporations. Finding answers requires new thinking and new skills, and then putting those ideas into action through the thoughtful application of technology, ensuring that the solutions are both scalable and sustainable.

39 percent of employers say a skills shortage is a leading reason for entry-level vacancies

<table>
<thead>
<tr>
<th>Country</th>
<th>% of employer respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>56</td>
</tr>
<tr>
<td>India</td>
<td>53</td>
</tr>
<tr>
<td>Brazil</td>
<td>48</td>
</tr>
<tr>
<td>United States</td>
<td>45</td>
</tr>
<tr>
<td>Mexico</td>
<td>40</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>38</td>
</tr>
<tr>
<td>Germany</td>
<td>32</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>30</td>
</tr>
<tr>
<td>Morocco</td>
<td>12</td>
</tr>
</tbody>
</table>

36 percent of employers also reported that a lack of skills caused “significant problems in terms of cost, quality, and time” or worse.


Stakeholders hold different views about the readiness of graduates for the job market

Agreement that graduates/new hires are adequately prepared

<table>
<thead>
<tr>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees^1</td>
</tr>
<tr>
<td>Providers^2</td>
</tr>
<tr>
<td>Youth^3</td>
</tr>
</tbody>
</table>

^1 Overall, employees we hired in the past year have been adequately prepared by their prehire education and/or training.
^2 Overall, graduates from my institution are adequately prepared for entry-level positions in their chosen field of study.
^3 Overall, I think I was adequately prepared for entry-level positions in my chosen field of study.


EMPLOYABILITY: A GOVERNMENT PRIORITY

- Job readiness and skill development are vital to reducing unemployment, poverty, and inequality.
- For every $1 invested in employability skills, $10–$15 can be generated to drive economic growth and national competitiveness.
- Governments want to integrate education and employability with research and development and innovation.
- Research shows governments currently suffer from inefficiencies in their skills acquisition models and skills usage models.
The transformative role of technology innovation

In today’s global economy, access to information, critical thinking, entrepreneurial skills, and a strong foundation in math and science are imperatives if we are to prepare tomorrow’s workforce to meet the skills demands of the knowledge economy.

Education is the single most powerful tool we have for meeting that need and unlocking new economic avenues to build a foundation for a brighter future. Technology plays an increasingly critical role in enabling and supporting that educational effort, linking millions around the world to the skills they need and the new opportunities to put them to use.

Expanding technology access is a crucial piece, especially for underserved populations. Connecting to technology can mean connecting to a wealth of financial, health, and education resources able to dramatically expand opportunities and improve lives. When working in concert, education and technology can be truly transformative, breaking the cycle of generational poverty and driving catalytic change across the planet.

Companies have long understood that technological innovation, if effectively harnessed, can transform business. The vigorous march of computing and communication advances has eliminated long-standing obstacles, opened up new vistas of opportunity, and forever changed how companies operate. Today, technology is doing the same for the advancement and benefit of people, communities, and countries.

A thoughtful, sustainable application of technology can enable communities to leapfrog existing obstacles to employment by preparing students for lifelong success and accelerating development and national competitiveness goals.

The global decline in STEM

Science, technology, engineering, and math (STEM) disciplines play an increasingly important role in employability. In the U.S., STEM occupations are projected to grow by 17 percent by 2018, compared to 9.8 percent growth for non-STEM occupations. Workforce projections by the U.S. Department of Labor show that 15 of the 20 fastest growing occupations require significant math and/or science training. By 2020, there will be more than 1.4 million computing-related job openings in the U.S. alone. But at current rates, with the number of STEM-related college graduates in the U.S. falling, only about 30 percent of those jobs will be filled by U.S. graduates.

At the same time, of the 15 major subject categories, engineering has the highest median earnings, yet less than 20 percent of students select a STEM path, with 38 percent of those students changing their majors away from STEM before they graduate. And of those who do go on to pursue a college major in STEM, only about half choose to work in a STEM-related career.

Countries across Europe, the Middle East, and Africa (EMEA) are also suffering from low achievement and low interest among students in STEM subjects and STEM-related careers compared to peers around the world. This problem is particularly acute in Western European countries.

Meanwhile, the STEM skills gap in European EMEA countries is widening compared to other regions across the globe. In Asian countries, STEM students account for up to 20 percent of the student population; in Europe, this percentage amounts to only around 2 percent. And while STEM interest is high among students in African and Middle Eastern countries, the quality of teaching and learning in the field is not at the same level.

While doing moderately better, Asia shares the rest of the world’s interest in advancing STEM. Currently, 63 percent of foreign-born STEM workers come from Asia, with most from India or China. Korea is working to encourage more bright students to stay with science and mathematics, while Japan is focused on declining participation and relative performance in STEM.
Economic growth through entrepreneurship

Entrepreneurship is a core driver of a country's sustainable growth. It acts as a catalyst for innovation, job creation, and economic empowerment for the citizens of that nation and beyond. According to the U.S. Census Bureau, self-employed individuals who have no paid employees operate three-fourths of U.S. businesses. The U.S. Small Business Administration reports that America's small businesses employ more than 50 percent of the private workforce, generate more than half of the nation's gross domestic product, and are the principal source of new jobs in the U.S. economy.

Youth are particularly important when nurturing a vital culture of entrepreneurial exploration. Nearly 80 percent of would-be entrepreneurs in the U.S. are between the ages of 18 and 34. A 2005 poll from Junior Achievement found that nearly 69 percent of the teenagers interviewed wanted to become entrepreneurs, even while knowing that it would not be easy. In spite of this overwhelming interest, youth rarely receive instruction about entrepreneurship as a career.

Developing a thriving entrepreneurial culture starts with education, investment, and infrastructure. Entrepreneurship education helps prepare people, particularly young people, to consider becoming entrepreneurs by immersing them in real-life learning experiences in which they can take risks, manage the execution of an idea, and learn from the results.

Ongoing research commissioned by the National Foundation for Teaching Entrepreneurship (NFTE) to evaluate the effectiveness and impact of its programs found the following when youth participated in entrepreneurship programs:

- Interest in attending college increased 32 percent
- Occupational aspirations increased 44 percent
- Independent reading increased 4 percent
- Leadership behavior increased 8.5 percent
- Belief that attaining one's goals is within one's control increased

In today's global economy, entrepreneurship is no longer just for entrepreneurs. Government is endeavoring to offer entrepreneurship programs that encourage young people to capitalize on entrepreneurial strategies and skills to increase their employability. According to the European Commission, the aim of entrepreneurship education and training should be to "develop entrepreneurial capacities and mindsets" that benefit economies by fostering creativity, innovation, and self-employment.

In today's global marketplace, technology plays an increasingly critical role in this process, helping enable and support the next generation of business leaders and companies. Technology is, therefore, a crucial ingredient in any entrepreneurship education program, providing the instruction, skills, and resources budding innovators need to build successful businesses designed for the knowledge economy.
Higher education and entrepreneurship

Universities act as engines of employment and entrepreneurship through their dedicated research projects. This includes direct employment such as the principal researcher, research team, lab technicians, and others who help support the work. Other indirect opportunities are generated through innovations that lead to new technologies, new industries, and new companies.

University research is at the core of knowledge-intensive industries including biotech, telecommunications, and information technology, while the innovations that flow from the research have led to the creation of countless companies, many of them now global leaders in their industries. Notable examples include Genentech, Cisco Systems, SAS, and Google, all of which started in university research labs.\(^\text{17}\)

Expanding local economic empowerment

Not surprisingly, institutions of higher learning are often active participants in their local economies as well. In addition to commonly being the area’s largest employer, they tend to attract other research-intensive businesses and stimulate the growth of supporting industries, which they rely on for goods and services.

Once the research is concluded, these same institutions play an important role in helping bring the results to the public. Often, this means serving as business incubators that provide the ecosystem necessary to move a company from concept to reality, including mentoring, technical, legal, and business support.

The global impact of academic R&D

Successful university spin-offs are not restricted to the U.S. In Sweden, Chalmers University produces 10 to 15 spin-offs annually, many of them small consulting and computer companies.\(^\text{17}\) The companies contribute $100 million to the local economy each year.\(^\text{17}\) In the United Kingdom, many of the 450 high-tech companies around Cambridge University started as university spin-offs. They provide more than half the manufacturing jobs in the region.\(^\text{17}\)

The Intel commitment to innovation for employability

A populace of smart, innovative, self-directed people is crucial for social progress and economic growth. Intel was founded by inventors, and the company’s continued success depends on innovation and entrepreneurship. The history of Intel reinforces the assertion that innovation is key to driving economic growth and improving social conditions. The company remains passionate about fostering entrepreneurship in communities around the world and advancing innovation to address global challenges.

Building on that heritage, Intel collaborates with governments, educators, NGOs, and industry to advance the cause of innovation and entrepreneurship. Intel has invested in programs and initiatives aimed at inspiring and providing education and critical skills for young entrepreneurs. The company creates and invests in efforts designed to give entrepreneurs the skills and resources they need to address community issues and create sustainable enterprises. Programs include:

- Technology-to-market accelerators
- Entrepreneurship and business plan competitions
- Ideation workshops
- Technology tools
- Entrepreneurship curricula and university seminars

Intel’s initiatives seek to increase individual employability, drive innovation, and accelerate economic growth with a focus on computing technology.

Intel has worked for decades to improve education globally, investing more than $1 billion in the past decade alone, and continues to invest at a rate of approximately $100 million a year. This includes the efforts to provide hands-on training and exposure to science, technology, engineering, and math (STEM) careers for girls and young women.

Empowerment starts with employability

Investing in the empowerment of people, especially underserved populations, is not only critical for their long-term employability, it is central to global economic opportunity and growth. As an employer, Intel understands that it has a vested interest in expanding the talent pipeline and creating educated, employable consumers in new markets.

Intel remains deeply committed to the idea that technology can serve this goal and have a transformative impact on people’s employment outlook. When part of a holistic strategy, technology supports scalable solutions that connect people, expand opportunity, and help address global challenges.
**Intel innovation and entrepreneurship programs**

**Girls and Women in STEM**
Intel and the Intel Foundation support a range of programs, competitions, and resources that seek to inspire and empower more girls and women to create and build the technology of the future. We focus on programs that feature hands-on activities such as "Maker" and coding, involve peer mentors and role models, and connect technology and engineering careers to positive social impact. Learn more at intel.com/girlsintech.

**Intel Foundation**
The Intel Foundation seeks to improve lives around the world through educational transformation and economic empowerment. By developing programs, exercising leadership, and providing funding for grants, the foundation fuels innovation in math and science education, empowers girls and women, supports underserved youth, and engages local communities. Over its 25-year history, the Intel Foundation has invested millions, including more than $500M since 2000 alone, and has matched nearly 4 million Intel employee volunteer hours with cash donations in more than 70 countries, regions, and territories. Learn more at intel.com/foundation.

**Intel® Galileo**
In the DIY tech-influenced community, nicknamed the Maker Movement, anything is possible when you combine hardware with software and add a little dose of creativity. In an effort to capture the imagination and inspire innovation, Intel has joined the movement with the debut of Galileo, an Arduino* compatible development board, at the 2013 Maker Faire in Rome. Galileo is a new microprocessor that enables creators and makers alike to more easily develop highly complex projects at an affordable cost. Learn more at intel.com/content/www/us/en/do-it-yourself/maker.html.

**Intel Global Challenge (IGC)**
Founded in 2005 as a collaborative effort between Intel and UC Berkeley, the Intel Global Challenge (IGC) at UC Berkeley is the world’s largest and most prestigious technology entrepreneurship competition. It seeks to support and promote entrepreneurship globally and predominantly in developing countries. Held annually at the Haas School of Business in Berkeley, California, IGC hosts teams from around the world and seeks to provide peer support, practical resources, and a means to gain exposure to venture capitalists, governments, NGOs, universities, and others. Learn more at intel.com/content/www/us/en/education/competitions/global-challenge/launching-entrepreneurs.html.

**Intel Ideation Workshops**
Intel Ideation Workshops provide participants with ideation and innovation skills training. The workshop invites attendees to go through an ideation process to come up with innovative solutions to identified problems. They are then given an environment to convert their innovation into reality. The entire workshop uses tools and frameworks based on the following four steps: exploration of user case and identification of problem areas, screening of new technologies and their application uses, creation of innovative solutions based on technology and user research, and learning prototyping and pitching. Learn more at entrepreneurship.intel.com/intelyouthenterprise.

**The Intel International Science and Engineering Fair (ISEF)**
ISEF is the world’s largest pre-college science fair competition. Each year, approximately 7 million high school students around the globe develop original research projects and present their work at local science fairs with the hope of winning more than $5 million in awards and scholarships. Those who do win progress to regional, state, and national competitions. Ultimately, the select few, 1,500 promising young innovators, are invited to participate in Intel's ISEF in the U.S. Learn more at intel.com/isef.

**Intel Start Making!**
As part of the Maker Education Initiative, Intel piloted this program in conjunction with the Intel® Computer Clubhouse Network to introduce middle school girls to the basics of circuits, coding, and making. Based on the pilot’s success, the program will expand to additional locations in the future. Learn more at maker.intel.com.

**Intel STEM Center**
The Intel STEM Center supports the aligned activities of partnering school districts and organizations by establishing shared measurement practices, mobilizing funding, advancing policy, and building public will to support change. The Intel STEM Center meets the needs of all students and teachers in partnering districts through coordinated access to the partnership’s programs. The center engages with whole schools to transform STEM teaching and learning by establishing Networked Improvement Communities (NIC) that are led by STEM Teachers on Special Assignment (TOSAs). Learn more at pdxstem.org/intel-stem-center.

**Intel Youth Enterprise Program**
The Intel Youth Enterprise Program focuses on developing ideation and innovation skills among students by giving them an opportunity to work on a real social challenge that will enhance the livelihood of underserved youth in their respective countries. The program, aimed at the 16- to 30-year-old age bracket, consists of an ideas framework that helps participants get an idea, validate it, develop it, and then test it in a real-world environment. Learn more at entrepreneurship.intel.com/intelyouthenterprise.
Intel innovation and entrepreneurship programs (continued)

Make It Wearable
Make It Wearable is a global, yearlong initiative sponsored by Intel to support the evolution of wearables. Students (ages 13 and up, except where prohibited), designers, engineers, and makers can get involved in two ways: the visionary track and the development track. The visionary track rewards futuristic thinking. The development track is for concepts that push the limits of what’s possible, balancing creativity with execution. Learn more at makeit.intel.com.

Maker Faire
In 2012, Intel collaborates with Maker Faire, a grassroots movement of entrepreneurs, inventors, and tinkerers who seek to encourage STEM careers and a culture of innovation. Described as the “Greatest Show and Tell on Earth,” the Maker Faire creates an opportunity for students to experience firsthand the satisfaction and rewards of hands-on work in fields such as computer coding and robotics. Unlike the science competitions sponsored by Intel, Maker Faires are not competitions. Intel is involved with the Maker Movement because it is a revolutionary, innovative way to foster innovation and encourage students to engage in science, technology, engineering and math (STEM). Learn more at maker.intel.com.

National Center for Women & Information Technology (NCWIT) AspireIT program
The Intel Foundation is supporting NCWIT’s AspireIT program to encourage middle school girls to learn about computing by engaging with mentors from high school and college. Inspired by the desire of young women in computing to “pay it forward,” AspireIT aims to employ a “near-peer” approach that provides middle school girls with a positive, sustained experience of learning and computing alongside their high school and college mentors. Learn more at ncwit.org/project/aspireit-middle-school-outreach-program.

STAY WITH IT™
The President’s Council on Jobs and Competitiveness, in collaboration with engineering schools, Intel, Facebook, MTV, and Google, launched the STAY WITH IT™ campaign. STAY WITH IT is the first student outreach campaign focused on connecting engineering students to a community of their peers and experienced engineers, role models and influencers to encourage and motivate them to stay with the field of study and graduate with an engineering degree. Learn more at staywithit.org.

Learn more at: intel.com/innovate/entrepreneurship.