Education is not an adequate defense against the rise of the robots

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Reported by: Martin Ford, Futurist, Software Developer/Entrepreneur
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The conventional wisdom has long been that the solution to technology-driven job losses is invariably more education and vocational training. As machines and smart software eat away at low-skill jobs, workers are urged to retool themselves and continuously climb the skills ladder, taking on roles that are beyond the reach of automation.

Economists refer to this propensity for technology to erode the value of lower skill work, while at the same time boosting the incomes of workers who are better equipped to participate in the information economy, as "skill-biased technological change" or SBTC. Evidence for the impact of SBTC can be found in the college wage premium. As of 2012, college graduates had average incomes that were over 80 percent higher than workers with only a high school diploma. Incomes for those with advanced degrees are higher still.
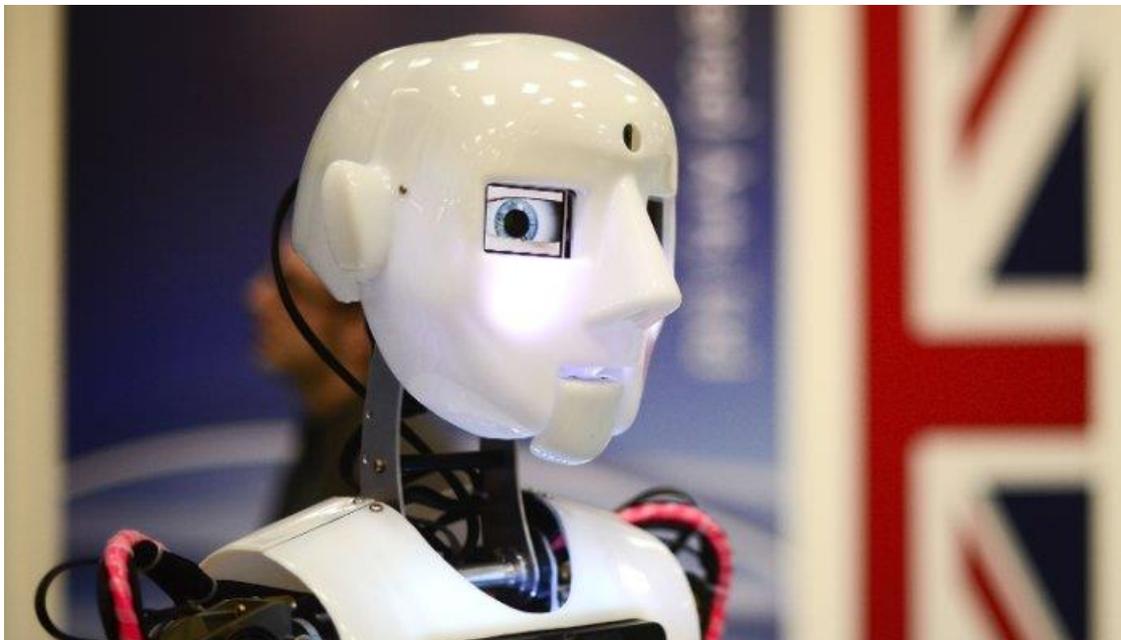
Delving further into the numbers, however, uncovers a discomfiting reality. That educational wage premium is being driven not by the fact that college graduates are inundated with opportunity—but rather because prospects for those with only high school educations are in

collapse. A 2012 analysis by Citi Research found that incomes for young workers with bachelor's degrees declined by a full 15 percent between 2000 and 2010, and that decline began well before the 2008 financial crisis. Any recent graduate can tell you that we have entered the age of the degree-bearing barista: as many as half of new college graduates end up taking jobs that don't utilize their education.

This disturbing trend was analyzed formally by economists Paul Beaudry, David A. Green, and Benjamin M. Sand, who published a paper entitled "The Great Reversal in the Demand for Skill and Cognitive Tasks" in March 2013. Their analysis found that the need for skilled labor in the United States peaked around 2000 and has since gone into decline. As a result, many college graduates are taking lower-skill service jobs—often displacing those without college degrees in the process.

It turns out that workers are not the only ones who can climb the skills ladder: computer technology is proving remarkably adept at the same feat. Indeed, it is a well known truth among those who work in robotics and artificial intelligence that it is often much easier to automate the information-based jobs held by white-collar workers than lower wage positions that require physical manipulation. Building a robot that can come close to replicating the visual perception, dexterity and hand-eye coordination of a human being remains a staggering technical challenge. In contrast, smart software already writes coherent news stories and reports, performs document analysis for law firms, and, of course, trades on Wall Street. The Defense Advanced Research Projects Agency (DARPA) is currently funding an $11 million project at Rice University designed to automate many aspects of routine computer programming.

The fact that high-skill jobs are disappearing leaves aside a second, obvious problem: not everyone in our workforce is destined to become a rocket scientist. Only a minority of the population has the combination of cognitive capability and motivation necessary to excel in technical fields. There is very likely a fundamental limit to the percentage of our workforce that we can expect to graduate from college and then take on a job that requires genuinely high levels of intellectual ability or creativity. In other words, even if the jobs at the top of the skills ladder were there in sufficient numbers, we would still ultimately have a serious problem finding a role for a large fraction of our workforce.

The hard truth is that the traditional solution to unemployment and poverty—and the solution that nearly all analysts and policy makers continue to support—is not going to be sufficient in the robotic age. Education has incalculable value both on a personal level, and as a public good that benefits society as a whole. For those reasons, we should continue to strongly support it and invest in it. We should not, however, expect ever more schooling to assure workers a foothold in the future economy.

Martin Ford is the author of *Rise of the Robots: Technology and the Threat of a Jobless Future* (Basic Books), winner of the [Financial Times and McKinsey Business Book of the Year Award 2015](). He is the founder of a Silicon Valley–based software development firm and has over twenty-five years of experience in computer design and software development. Follow him on Twitter: [@MFordFuture]().

Submitted by Alison Edwards – Cardinia Shire Council