We're All in This Together

It really boils down to this: that all life is interrelated. We are all caught in an inescapable network of mutuality, tied into a single garment of destiny. Whatever affects one directly, affects all indirectly. We are made to live together because of the interrelated structure of reality.

—Martin Luther King Jr. (Wilson, 2018)

On Christmas Eve 1967 in his last sermon at Ebenezer Baptist Church, King spoke of the interconnected world in which we live. A half a century later, his prophetic words take on new meaning as we face extraordinary opportunities and existential threats.

The first part of this chapter outlines our new mutuality and responsibility to try and live more interconnected lives. A new mutuality requires more than ever that we depend on and rely on one another. We make the case for making a difference and living in a way that is not just in service of self but that puts the well-being and vitality of others and our communities at the heart of learning and life.

We present an Earth Owners Manual, or the 25 most important issues of our time. We believe these issues ought to be the frame for learning in schools—driving students' lifelong quest to find purpose and contribute through meaningful projects and work.

A New Mutuality

Change will not come if we wait for some other person or some other time.
We are the ones we've been waiting for. We are the change that we seek.

—*Barack Obama*

In 1980, there were no cell phones, laptops, no email, no GPS, no Wikipedia, no search engines, no social media. From a legal pad to a tablet, from drafting board to computer-aided design, from eight-track tape to streaming audio, the 40-year information age transformed the work of almost every sector.

The election of 2016 signaled the end of the information age and the beginning of the automation age. If Barack Obama was elected by social media, Donald Trump was elected by algorithms that exploited social media. By 2016, many of us lived in information gullies co-constructed by bias and bots. Ironically, major-party candidates fought a 1990s battle while the rise of artificial intelligence (AI) became apparent in every aspect of life and work.

In this chapter, we discuss

- The automation economy powered by the Fourth Industrial Revolution
- Three great challenges of economic dislocation and concentration, emerging ethical issues and curbing misuse, and complexity and unpredictability
- Why this time is the best opportunity for difference making we've ever had

The World Economic Forum calls this the Fourth Industrial Revolution. The first industrial revolution, powered by steam, launched mass production. The second revolution added electricity to everything. The third revolution, the information age, added computing power. This new revolution,

powered by AI, is adding cognitive capabilities to everything—and it's a game changer.

The concept of AI was conceptualized more than 60 years ago, but the idea that machines could learn from big data sets was so computationally intensive, it was largely dormant for decades. About 10 years ago, computer chips got fast enough that machines could plow through big data sets quickly. In 2011, IBM's Watson, a natural language processing (NLP) system, beat Ken Jennings at Jeopardy, a signal that things were about to change. In 2012, the author (Tom) hosted the Automated Scoring Assessment Prize, which demonstrated that NLP systems could score long and short essays with accuracy matching trained graders.

By mid-decade, neural networks, another category of machine learning, improved dramatically. In 2016, Google's AlphaGo won four of five games in a Go match with champion Lee Sedol. In 2017, language translation systems improved significantly, and Facebook added facial recognition.

Simultaneous with the rapid development of machine intelligence was the explosion of the internet of things (IoT)—billions of connected sensors in everything and cameras everywhere. Applications include home and commercial security, medical monitoring, transportation and logistics. There are more than 20 billion connected devices worldwide and could be more than 50 billion by the end of the decade (Statista, 2019). All of these phones, sensors, and cameras produce mountains of data that feed machine learning algorithms used in every sector of the economy.

The third part of the automation age revolution (with AI and IoT) is the enabling technologies that produce tangible benefits: automated manufacturing systems, robots, delivery drones, autonomous vehicles, drug discovery systems, and gene editing tools. The combination of machines that learn from sensors everywhere and convert intelligence into benefits offers unparalleled opportunity for contributions to health, longevity, safety, and prosperity.

Great benefits and unprecedented wealth are being created by this revolution, but it comes with three great challenges. The first is economic dislocation and concentration of benefit. The second is new ethical issues and emerging forms of misuse. The third is the complexification of how human systems interact with one another and the planet.

Dislocation and Concentration

AI, particularly machine learning, and related exponential technologies are quickly augmenting many tasks at home and work. They will increasingly displace jobs while creating new entrepreneurial opportunities. There are many competing claims about how severe the displacement will be and to what extent it will be offset by new jobs. It appears clear that displacement will vary by sector and geography, but it will be significant and it will begin before today's middle school students graduate and join the workforce. It is also clear that more people will be out of work more frequently with repeated, even continuous need for upskilling (upgrading their skills in new arenas).

Compared to prior revolutions, this one is occurring at an exponential speed. Some predict that we will see more change in the next 20 years than

we have in the last 300 years (Leonhard, 2016). While impacts may be ubiquitous, control is unusually concentrated. AI is a centralizing force—it plows through monster data sets in seconds, aggregating benefits and wealth at an unprecedented speed. It propelled tech giants Apple, Amazon, Microsoft, and Google to market valuations of more than one trillion dollars (at least before the pandemic crash) and produced many of the 2,100 billionaires on the planet (again, pre-crash). Two dozen billionaires have the combined wealth of the poorest half of the world's population (Oxfam, 2019).

Code that learns is both powerful and dangerous. It threatens the basic rules of markets and civic life. It's curating almost every screen you read, exacerbating racial bias through things like facial recognition for policing and making or influencing decisions about hiring, loans, and jail sentences.

AI is reshaping life and livelihoods. And without forward-looking civic leaders and quick and thoughtful action, the wealth and benefits will be highly concentrated, leading to conflict and more reactionary politics.

AI requires a new technical and civic infrastructure, a new way to conduct business, a new way to be together in community. Needless to say, the technology is moving faster than new social agreements. The potent combination of technologies is swamping communities with complex issues and a combination of predictable and unanticipated consequences.

Technology Through a Lens of Equity and Social Justice

Washington Leadership Academy (WLA) opened in the nation's capital in 2016 after winning an XQ Superschool grant. Its mission is "to prepare our kids to thrive in the world and change it for the better."

All WLA students take 4 years of computer science and coding. WLA students—almost all of whom are people of color and from low-income households—look at technology through a lens of equity and social justice. They study the intersection of technology and public policy; listen to guest speakers, often also people of color who work in the tech sector; and learn how tech can strengthen their communities.

In other words, they don't just learn how to operate computers. They learn how computers influence society.

"The way we teach computer science is not strictly about coding, because coding always changes," said Jordan Budisantoso, one of WLA's five computer science teachers. "It's about how to think about problems. It's about logic. It's about gaining an understanding of how technology shapes our world" (XQ Institute, 2019, December 9).

All WLA students participate in internships with government, private sector, or nonprofit organizations during the eleventh grade.

Curbing the Misuse of Smart Machines

Code that learns is aiding every aspect of life. We can look forward to more convenience, less disease, cleaner energy, and safer and cheaper transportation. But AI is moving faster than public policy. In addition to job dislocation

and growing inequality, there are opportunities in three areas to shape the future for good and curb misuse of AI: discrimination, autonomous weapons, and excessive surveillance.

Discrimination

As more machines make more judgments, we're seeing old biases baked into decisions about facial recognition, criminal sentencing, and mortgage approval.

"Algorithmic bias is shaping up to be a major societal issue at a critical moment in the evolution of machine learning and AI," said the MIT Tech Review (Knight, 2017). "If the bias lurking inside the algorithms that make ever-more-important decisions goes unrecognized and unchecked, it could have serious negative consequences, especially for poorer communities and minorities."

"Because math is involved people think it leaves out bias, but it's only operating on the data from humans," said Olin professor Amon Millner (T. Vander Ark, 2019, March 20), stressing that if the data are inequitable, bias will be present in the recommendations for who gets a job, who gets a loan, and who goes to jail.

"We need diverse teams to study how we're applying algorithms to ensure that we treat people fairly," said Millner (T. Vander Ark, 2019, March 20). He's worried that right now these decisions are being made by teams that are not very diverse in race and gender.

The more insipid self-imposed threat of discrimination is our own media feed trained by a series of selections and swipes that over time create a filter bubble that narrows the scope of content to which we are exposed.

Exploring the Ethics of Artificial Intelligence in Middle School

In the fall of 2017, Justin Aglio spotted AI as a game-changing trend. The Director of Academic Achievement and District Innovation at Montour School District created partnerships with nearby Carnegie Mellon University and with MIT to "develop a program in artificial intelligence (AI), providing students with a myriad of opportunities to explore and experience AI, using it to cultivate, nurture, and enhance initiatives aimed at increasing the public good (2018)."

In 2018, the district launched a middle school ethics course developed with MIT Media Lab to explore the ethical issues AI presents and to study how ethical AI could be created. Case studies explored algorithmic bias and fairness, facial recognition, and privacy.

Why start in middle school? Blakeley Payne from the Media Lab notes that, on average, children receive a cell phone around age 10 and open a social media account when they are 12 (Aglio, 2019). Their screen time is being curated by AI.

In addition to ethics, Montour middle schoolers dive into autonomous robotics and make AI music. Montour teachers embedded AI units into Media Arts, STEM, Music, and Computer Science classes.

"The goal for the program is to make an all-inclusive AI program for all middle school students that is relevant and meaningful in a world where children live and prepare them for a future where they will thrive," said Aglio.

Killer Robots

Team MAVLAB from Delft University of Technology won the $1 million first prize in the 2019 AI Robotic Racing Circuit race. Lockheed Martin sponsored the competition to showcase drone capabilities and catalyze innovation in autonomous systems command and control.

While drones promise inexpensive fast delivery and affordable monitoring in many sectors, the flip side is that drones are being weaponized and are changing the character of warfare as evidenced by the flock of Iranian drones and missiles that crippled a Saudi oil refinery in September 2019. The attack made clear that a fleet of cheap drones poses a threat to individual targets as well as big targets like ships and bases. With more autonomy, these weapons will pose an even greater threat.

The Campaign to Stop Killer Robots was formed in 2012 to counter the threat of machines gone bad. The campaign, backed by Tesla's Elon Musk and Alphabet's Mustafa Suleyman, seeks to ban such machines outright. The United Nations is also scrambling to get ahead of this threat. As chair of the United Nations' Convention on Conventional Weapons, Amandeep Gill has the difficult task of leading 125 member states through discussions on the thorny technical and ethical issue of killer robots.

Surveillance

Chinese municipalities are using facial recognition technology and AI to clamp down on crime. The Chinese Ministry of Public Security said that in 2020 they will have 626 million cameras in an unprecedented national surveillance system (Keegan, 2019). Beijing-based SenseTime, the world's most valuable AI company, claimed in 2018 that Guangzhou's public security bureau had identified more than 2,000 crime suspects with the help of the technology.

China is also rolling out a social credit system that tracks the activities of citizens to rank them with scores that can determine whether they can be barred from accessing everything from plane flights to certain online dating services (Kobie, 2019).

A majority of hedge funds are now using AI and machine learning to help them make trades. This has all made markets faster, more efficient, and more accessible to online investors. However, a Bloomberg reporter said, "The kinds of data that the really high-end firms are using isn't as anonymized as you might think." And for some investors, "there's a lot of information about you that can be traced to you specifically" (Wood, 2019).

The explosion of cameras and sensors and expanding use of AI is boosting the amount and type of information being tracked about every person, making it possible to link data and make inferences about each of us. College students are being surveilled as they walk across campus and enter lecture halls (NPR, 2019). These emerging capabilities represent unimagined difference-making opportunities and substantial, even existential, risks.

Take Waze, a popular transportation app, which started as a GPS and mapping tool, is curtailing traffic and guiding our driving behaviors with predictive analytics and countless data points being collected by the second. Waze isn't just a map app anymore; it is influencing our driving behaviors and beliefs about communities.

AI is currently smart in narrow bands, but the next few decades will, given the drive of curiosity and profit, bring about broader forms of intelligence, what some call Artificial General Intelligence. The risk, says Berkeley's Stuart Russell, is less the malice of science fiction movies, but rather more the competence of smart machines to accomplish goals that are not well aligned with ours (Russell, 2019). Managing AI alignment may prove to be humankind's most important accomplishment—or our biggest failure.

The difference—likely to be a hinge in history where things get better for most people or worse—is likely to be whether AI is approached with a contribution or extraction mindset. If investors and developers seek to exploit short-term opportunities for personal gain, AI will increasingly be a threat to the public good. But if policymakers, users, and funders and developers embrace a contribution mindset—with a focus on doing the most good for the most people in the long run—there is a good chance that our children will experience the benefits of health and prosperity.

New and Different Challenges

The Fourth Industrial Revolution is racing around a planet ravaged by the first three. We are probably six decades into the Anthropocene, a new geologic era where the byproducts of human activity have altered the climate and landscape of the planet (Turney et al., 2018). The result is a predictably less predictable climate system.

With terrible force, the summer of 2017 brought a series of once-in-a-century storms that swamped the southern United States. In December 2017, the Thomas Fire burned more than a quarter million acres in Ventura and Santa Barbara Counties—only to be nearly doubled in devastation 11 months later by the Mendocino and Camp fires. The November 2018 California wildfires brought even more devastation, making them the most expensive in history (Gee, 2019).

After the California wildfires, the most expensive disaster of 2019 was Typhoon Hagibis, which caused about $15 billion damage in Japan. "Storms like Hagibis are growing more common, and at a surprising pace," Said science writer Erick Mack (Forbes, 2019).

Early 2020 brought the COVID-19 pandemic worldwide, bringing much of the global economy to a standstill and halting many services, education, and public gatherings and causing hundreds of thousands of deaths.

These unanticipated and unprecedented events are suggestive of a new era where evolving natural systems collide with complex human systems in unpredictable ways, an era of novelty and complexity. We are not yet equipped as a species to handle the complexities we have created.

The New Mutuality

The rise of AI will produce unprecedented wealth, broader access to clean energy, and the mitigation of disease and drudgery. But with the benefits of AI come numerous threats—some directly existential and some socially

cancerous, like spreading inequity. Sharing the benefits and taking action to mitigate the risks require a new sense of mutuality.

The climate crisis is one big collective action problem. We need to stop taking carbon out of the ground and putting it into the atmosphere. We need to find ways to take carbon out of the atmosphere and put it in the ground. The former will throw millions out of work and we'll need to find ways to support their transition. The latter will take public investment and support for entrepreneurship. We need to reduce consumption and increase invention—it's a collective action problem.

It is increasingly one climate system, one economy, and one media market. In a growing number of ways, small and large, we are all connected. We are all in this together.

No Better Time to Make a Difference

What does this all mean for teaching and learning? What does it mean for communities seeking to improve their educational ecosystems? How do these new technologies impact our livelihood and economy? It means it is time we come together to rethink how we interact, engage, and design for novelty and complexity. This new era undoubtedly yields paradoxical implications, but it also presents incredible opportunities to create a better future for all.

The good news first: It has never been easier to make a difference—and the opportunity set improves every month. Many of the world's great challenges and opportunities will be addressed by teams equipped with smart tools. The potential to curtail disease, create clean energy, automate manual tasks, expand access to abundance lifestyles, and explore the universe is imminent and exciting. It's never been easier for young people to learn, connect, launch an impact campaign, code an application, or start a business.

The flip side is that current challenges, particularly climate change and unsustainable inequity, require immediate and global action. The wealthiest people in the world—like Jeff Bezos, who committed $10 billion to fight climate change—are taking the initiative in their own hands if world leaders are choosing not to. Each month, new technology adds puzzling ethical questions and compounds existential threats. The one thing we can be sure of is that we—and especially our children—will see more rapid and complex change than ever before. From this, we conclude that Seth Godin's 2012 insight was spot on—that our educational priorities should be leadership and solving interesting problems (Schawbel, 2014).

In Chapter 2, we summarize how, given our current realities and unforeseeable future, we have to double down on creating meaning and purpose in school, work, and lives of young people. We detail the benefits of leading with contribution and how it not only makes a difference in communities but in our overall mental health and well-being.