ARMAND DOUCET, JELMER EVERS, ELISA GUERRA,
Dr. NADIA LOPEZ, MICHAEL SOSKIL AND KOEN TIMMERS
WITH A FOREWORD BY KLAUS SCHWAB AND AN EPILOGUE BY ANDREAS SCHLEICHER

ROUTLEDGE

TEACHING IN THE FOURTH INDUSTRIAL REVOLUTION

STANDING AT THE PRECIPICE

GLOBAL TEACHER PRIZE
VARKEY FOUNDATION

"A must read for anyone concerned with the future of education today."
IRINA BOKOVA, Director-General of UNESCO (2009 – 2017)

"The Global Teacher Prize is a one million dollar prize that is awarded to one exceptional teacher who has made an outstanding contribution to the profession. It was set up to shine a spotlight on the profession in order to celebrate the important role teacher's play in society. By unearthing thousands of stories of heroes that have transformed young people's lives, the prize brings to life the exceptional work of millions of teachers all over the world. In this book, some of our leading finalists give us their unique insights into how we can teach the next generation to flourish in a world that will be revolutionized by artificial intelligence, automation and new communication technologies."

"If we are to recognize the contribution of the world's teachers, we must seize every possible opportunity to give them a voice. Teachers point and guide the way, opening young people's hearts and minds, whilst preparing them for the opportunities and threats that the future will bring. Through spreading teachers' very different stories about how they light the spark of curiosity, we can help give the gift of a good education to every child."

Sunny Varkey, Founder of the Varkey Foundation and The Global Teacher Prize, UAE

"The big picture of change – why education matters, what its purpose should be, how this can be done in a rapidly changing world - is usually owned & controlled by academics and policy-makers. Teachers are left with lots of little pictures of things to do and implement in their own classes. From some of the world's best and most recognized classroom teachers, this book shows how and why teachers must also understand and own the big pictures of change about social justice, peace, democracy, innovation and sustainability – and make these things come true in every class with every child. This is a truly uplifting book by great teachers who are also public intellectuals."

Andy Hargreaves, Thomas More Brennan Chair, Lynch School of Education at Boston College, USA

"As our world becomes increasingly complex and divided, our need to foster communities that are healthier, more empathetic, and embrace our shared humanity has never been greater. The authors, among the most highly recognized educators in the world, give us a path forward to achieve this goal. Combining research with compelling narratives, this book demonstrates how education that is rooted in humanity can help foster a new generation of leaders – leaders who adopt a sense of responsibility to other human beings and can act on our collective power to

solve society's biggest challenges. This is a must read for educators and for anyone who has an interest in creating a better and kinder future."

Daniel Lubetzky, CEO and Founder at KIND and Empatico, Mexico

"This is an unusual education book. It is built around six individual teacher voices from schools around the world asking the same question: Can teachers make a difference to prepare us for the Fourth Industrial Revolution? Read this book to find out how passionate practitioners can have optimistic professional dialogue about what we need to do and how to transform education systems to be good for all our kids."

Pasi Sahlberg, author of Finnish Lessons 2.0, Finland

"Those who write about education tend either to celebrate or to castigate the disruptive aspects of technology. In this collection of essays, thoughtful educators reflect on how best to combine the powerful potential of the new technologies with the valuable, indeed irreplaceable qualities of excellent human teachers."

Howard Gardner, John H. and Elisabeth A. Hobbs Professor of Cognition and Education at the Harvard Graduate School of Education at Harvard University, USA

"Education is more than the communication of information, it is the impartation of wisdom, birthed by experience, to the next generation. Teaching in the Fourth Industrial Revolution opens a window beyond academics, into real life."

Dr. A. R. Bernard, Founder and Senior Pastor, Christian Cultural Center, USA

"More than just ideas, this collection of essays provides practical strategies and powerful models disrupting mediocrity within a stagnated education system. Each author offers a candid view of the challenges teachers' face due to the inequities in their classrooms, while sharing stories of hope and promise for the future. If we seek to revolutionize education and prepare children for the Fourth Industrial Revolution, this book offers great insight from the educators doing the work."

Juliet Blake, Head of Television & Curator of Special Projects, TED, USA

"This is a moment in time. How do we prepare students for the Fourth Industrial Revolution? Written by some of the world's most

outstanding educators, Teaching in the Fourth Industrial Revolution: Standing at the Precipice is an insightful work on how to help students thrive. An invaluable resource for the world's educators."

C. M. Rubin, Founder, The Global Search for Education, USA

"This book makes a compelling contribution to our thinking on education in the decades ahead. The authors – all world-leading teachers – discuss how education can promote a prosperous, just and peaceful future for the world during a time of huge technological upheaval. Through topics such as social media, collaboration across sectors, and the personalization of teaching, the authors also elaborate on their individual pedagogical approaches, drawing on decades' worth of experimentation in the classroom. The result is an authoritative guide to educational practice over the next three decades."

Vikas Pota, Chief Executive, Varkey Foundation, UK

"Are you tired of seeing your students' potential go unrealized and do you feel in your heart of hearts that you could be doing so much more to preserve and protect our imperiled world in a time of unprecedented societal transformations? If so, "Teaching in the Fourth Industrial Revolution" is the book for you! With vivid, hands-on examples, the authors describe how we can work with our students, colleagues, and community partners to uplift education in the years ahead. Best of all, the authors are not afraid to advance big ideas with solid practical foundations beneath them. Here is a book that truly is essential reading for all educators who are serious about paving the way to a better future for all of our students."

Dennis Shirley, Professor of Education at the Lynch School of Education at Boston College and Editor-in-Chief of the Journal of Educational Change, USA

"Our planet is struggling to support the methods adopted and the pace of development that we aspire. Many thresholds are close to being breached because of myopic policies and wise decisions are needed to delay and defer the crises. The society needs leaders who can understand the complexities of the processes that are contributing to the problems and those that can counter these. The most critical investment our generation can make, in terms of ideas, time and resources, is in the field of education. This publication has thought provoking essays that stimulate discussion and debate on the problems and potential

of education world-wide. There is understandable stress on the need for developing capacity for critical thinking in the course curriculum, delivery methods and assessment of progress from early years. The authors, each a highly recognized teacher and very passionate about nurturing global health, aim at developing empathy at the heart of the education system. This needs to be read by all educationists and policy makers."

Er Anuj Sinha, Former Adviser, Department of Science and Technology, Government of India, New Delhi and Chairman, Network of Organisations for Science and Technology Communication, India

"The bedrock of a democratic country is universal; equitable public education. You cannot achieve sustainable economic and social well-being for any country unless all citizens have equal access to affordable education, ideally from two years of age onward. This book explains and demonstrates how to get that educational foundation."

Honourable Margaret Norrie McCain, Canada

"Education and teaching do not conform to a single definition or one set of rules. The world is changing and education must change with it. Perhaps there can be no discussion as important to our children and the world itself, than that of how to prepare future generations to deal with global challenges. The authors share some difficulties teachers face today, but also possible solutions – including bringing the human aspect back to education in a technological and connected world."

Céline Cousteau, Filmmaker and Explorer, Founder of CauseCentric Productions, USA

"New forces are at work in the world: accelerating globalization, technological revolutions, increasing inequalities and global warming. All call for new models of living together as responsible global citizens. This starts with education that makes a difference in the life of every child and youth, whatever their circumstances may be, and empowers them with the confidence, knowledge, ethics and empathy to contribute to their communities and societies. This is the promise of Sustainable Development Goal 4 that aims to 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.' This book brings together six wonderful teachers who share one same

passion: to make education a truly transformative experience that harnesses technology to connect, but most importantly, empowers teachers and learners through a relationship founded on respect, collaboration and creativity and the conviction that to every learning difficulty, there is a solution. This is a must read for educators, practitioners, decision-makers, parents and anyone concerned with the future of education today."

Irina Bokova, Director-General of
UNESCO (2009–2017)

"In *Teaching in the Fourth Industrial Revolution* six reflective and highly accomplished teachers ponder about the present and the future of the world and of humanity and ask: how could education best serve children so they build a better future? Drawing on years of practice, conversations with colleagues, study of classical texts in education, as well as current education research, they develop insightful and provocative answers to key questions about the present and the future of education. As they pause to ask important questions about what purpose their own teaching practice, and the practice of other teachers around the world, should serve to build a better future, these teachers embody the highest standards of any profession. Their insights have consequential implications for how to structure and support teacher practice and teacher education and lifelong learning.The valuable result of the collaboration of these teachers from four different countries exemplifies also the power of diverse groups to generate creative insights to some of the most thorny challenges of our times. Anyone interested in the future of education should read this book."

Fernando M. Reimers, Ford Foundation Professor
of the Practice of International Education and
Director Global Education Innovation Initiative
and International Education Policy Program at
the Harvard Graduate School of Education, USA

"The collective voices from effective educators around the world can be finally heard in Teaching in the Fourth Industrial Revolution. The authors, outstanding teachers themselves, reflect on their role as technology enters the classroom. They discuss the challenges of inequity, the perils of education systems that disregard teachers and their insights, and the need for society to step up and claim its place in raising our children. As they stress, human interactions remain at the core

of the learning experience; the reader is invited to witness first-person accounts into exceptional teaching practices. This book is the opening line to the discussions we all need to have about education for 2030 and beyond."

Emiliana Vegas, Division Chief of Education
Inter-American Development Bank, USA

"At a time when the world is facing serious issues, this book makes clear that the solutions begin with education. By blending the perspectives of educators with diverse backgrounds, the authors show how we can improve education systems around the world to create a new era for our planet in which every child is encouraged to believe that anything is possible. Simply put, this book shines a light on how we can prepare our children and our students for the world of 2030 and beyond."

Hanan al Hroub, Recipient of the 2016
Global Teacher Prize, Palestine

"There is an old military adage that states: Time spent on reconnaissance is never wasted. Anticipating what lies around the turn in the road has always been a critical matter in any environment. The same is true in Education – only more so. Looking to the future, anticipating issues and suggesting approaches that will bring the next generation to the level of dealing with the critical and complex societal and political issues to be faced, is the challenge. Education is not only the vanguard – it is the solution. This book, by a group of very accomplished teachers and forward thinkers in education, opens the door and lets us have a look at that process. This book is a compelling and authoritative view into that process and that future."

James E. Lockyer, c.r./Q.C., Professor Faculty
of Law, Université de Moncton, Canada

"Education is the foundation for everything else that we want to achieve and the commitment of the teaching profession is to ensure free public quality education for all children. We need a democratic, professional, self-confident, well-supported and versatile teaching profession that has professional autonomy and professional capital. As these authors – and colleagues – show, it is only by building trust that we will take teaching and education forward. In these uncertain times this book comes at the right time and shows us what can be achieved if we start trusting all our teachers."

Fred van Leeuwen, Secretary General,
Education International

"The contributors to this book paint a compelling portrait of how we should approach education if we are to provide a sustainable future in a rapidly changing world. The vital lesson to learn from these teachers is the degree to which education must lead the way as governments seek to ensure that society benefits from the Fourth Industrial Revolution."

The Right Honourable Paul Martin, P.C.,
Former Prime Minister of Canada

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Teaching in the Fourth Industrial Revolution

In this visionary book, written by six internationally recognized Global Teacher Prize finalists, the authors create a positive and hope-filled template for the future of education. They address the hard moral, ethical and pedagogical questions facing education today so that progress can serve society, rather than destroying it from within our classrooms.

This blueprint for education finally brings forward what has always been missing in education reform: a strong collective narrative with authentic examples from teachers on the front line. It is a holistic, personalized approach to education that harnesses the disruptions of the Fourth Industrial Revolution to better shape the future for the next generation, and ensure that every child can benefit from the ongoing transformations.

A great read for anyone who has an interest in educating our youth for these uncertain times, highlighting why teachers will always matter.

Armand Doucet, Jelmer Evers, Elisa Guerra, Dr. Nadia Lopez, Michael Soskil and **Koen Timmers** are amongst some of the world's most influential and innovative classroom teachers. As visionary and award-winning educators, they are recognized throughout the globe for their unique and groundbreaking approaches to education. Their ideas are celebrated in a number of different sectors.

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Teaching in the Fourth Industrial Revolution

Standing at the Precipice

Armand Doucet, Jelmer Evers, Elisa Guerra, Dr. Nadia Lopez, Michael Soskil and Koen Timmers

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Foreword

As the Fourth Industrial Revolution unfolds, it is certain that how we learn, earn, work and live will go through fundamental shifts. Many of today's education systems are already disconnected from the competences needed to function in today's labour markets and the exponential rate of technological and economic change threatens to further widen the gap between education and the demands of the global workforce. In turn, this creates barriers to individuals' ability to create value in the global economic system and, more importantly, fully realize their potential. Now more than ever, it is critical that we create a new integrated, agile, sustainable and lifelong education system that matches the needs of the future. Fortunately, entirely new ways of teaching and learning have also begun to emerge and can point the way to the future.

What does Education 4.0 look like? The forward-thinking educators in this book have developed a timely collection of insights about the future of education within the context of the Fourth Industrial Revolution. Each author has been nominated for the Global Teacher Prize for their pioneering work in education. The annual Prize is awarded by the Varkey Foundation, an innovator in leading change in education globally, including through their engagement with the World Economic Forum.

It is clear that we must reform our curricula to teach a newer range of material to youth and adults alike as technology disrupts nearly every field. In addition the ability to engage with and use technology will be critical for students. However, students must be adept not only at understanding technological change and using technology, but also in developing profoundly human skills such as leadership, social-emotional intelligence and critical thinking. If competition has defined the education of the past, collaboration, empathy and teamwork will

define the education of the future. Moreover, we need to impart students with a new flexible and adaptable mind-set about learning, one that emphasizes the need for continued, lifelong learning. To embrace such a mind-set, students must learn to be curious about their changing environment and develop the resilience necessary to not just manage but to thrive on change.

The future of education content is thus neither wholly digital nor wholly human but a hybrid of both. This applies to teaching too. Embracing technology as an instrument of empowerment in the classroom can enhance teaching. Innovations in technology today make it possible to synthesize and analyse data to tailor pedagogy to individual student needs and provide feedback in real time; significantly reduce costs; allow students from drastically different parts of the world to collaborate on projects; and create platforms for sharing best practices across the world. Teachers must thus work in tandem with technology to provide holistic education that prepares students for the future. Only a strategic integration of personal coaching and digital learning can provide both the technological and human-centred skills necessary to thrive in the Fourth Industrial Revolution.

The authors in this book have shared personal experiences of the impact of technology on the nature of their work, and best practices for successfully integrating these changes in the classroom to benefit student learning. Each has discovered unique and innovative methods for using technology to amplify their teaching.

The Fourth Industrial Revolution may be driving disruption, but it is wholly in our power to address the challenges and embrace the new opportunities. In the case of education, we can harness the disruptions to yield incredibly positive results. While there is no silver bullet, creating a successful strategy to integrate technology and education to face the challenges ahead will ultimately require effective collaborations among policy-makers, educators, businesses and civil society. The remarkable educators in this book have set the stage for designing an education system that matches the needs of the future and it is my hope that all stakeholders can work together towards unlocking a new golden age in education.

Professor Klaus Schwab,
Founder and Executive Chairman,
World Economic Forum
4 December 2017

Author Biographies

Armand Doucet

Armand Doucet is a visionary, award-winning educator, social entrepreneur and business professional. A sought-after leader, inspirational speaker, author, columnist and blogger in multiple fields, Armand has contributed to CBC, Education Partners, BrainStem Symposium, STEM Educators Symposium, Atlantic Education Summit, Teach SDGs and TedX. He has led and collaborated with teams from around the world and across different industries to success in health, education, non-profit organizations and business. Armand was the president and founder of the Ironwill Foundation and was also part of a team of teachers who brought Harry Potter to life at Riverview Middle School, connecting the school to over 1.8 million people around the globe. Recently, Armand founded *Life Lesson Learning*, which is working to change teaching worldwide by giving competencies and character development its proper place in the classroom through his Passion Projects initiative. Armand received the Canadian Prime Minister's Award for Teaching Excellence 2015, is a Meritorious Service Medal Recipient Governor General of Canada, is an Apple Distinguished Educator and Teach SDGs ambassador, and he has just recently been nominated in the Top 50 for the Global Teacher Prize. A two-time Ironman athlete, he currently is inspired by the best colleagues in the world, while teaching at Riverview High School in the Anglophone East School District of the New Brunswick Department of Education.

Jelmer Evers

Jelmer is a history teacher, writer and innovator. He teaches at an innovative school: UniC in Utrecht, the Netherlands. He proposes a renaissance of education with teachers in the lead on all levels. In 2015, his book *Flip the System* was published around the world. Evers has been nominated teacher of the year 2012 and has received several other national awards. He was nominated twice for the Global Teacher Prize in 2015 and 2016. In 2013, he edited an influential book called *Het Alternatief* (*The Alternative*) featuring articles from renowned scholars like Andy Hargreaves, Howard Gardner and Pasi Sahlberg. The book made an enormous impact and was debated in Dutch parliament a month after publication. Several policy recommendations of his have been put into practice: less standardized testing, more hybrid teachers and a strengthened professional body which runs a teacher-led €5-million innovation fund (Lerarenontwikkelfonds). Amongst others, he was also on the design team of a new teacher education institute: De Nederlandse School. In 2015, a new international book called *Flip the System: Changing education from the ground up* was published worldwide, and Swedish, English and Australian spin-offs have been published or are in the works. He is a co-founder of TEN Global: a new Global Teacher and Educator Network with Education International.

Elisa Guerra

Elisa Guerra was named the Best Educator in Latin America by the Inter-American Development Bank IDB in 2015, and was a Top 50 finalist for the Global Teacher Prize in 2015 and 2016. When she could not find a school in her hometown of Aguascalientes, Mexico, that was challenging and stimulating enough for her own children, she founded Colegio Valle de Filadelfia. Her

model has been escalated, and there are now nine campuses in three countries. All over Latin America, Elisa has worked with both privileged and underprivileged children and has lectured in English and Spanish around the world. She trains teachers online and has taught more than 2,000 educators from 56 countries. She runs the Latin American chapter of The Institutes for the Achievement of Human Potential, an international NGO teaching parents how to help their children affected by a brain injury. Elisa has authored 25 textbooks for students and teachers. Pearson Education published the series for preschoolers in 2014. Her books for elementary school students followed in 2017. At her school in Aguascalientes, Elisa teaches early reading, global citizenship, social studies and technology. She is passionate about early education and special needs children. Al Jazeera featured Elisa in a 2017 documentary titled *Mexico: The Power or Early Education* for the series Rebel Education, which aim was to showcase the most innovative education initiatives from around the world.

Dr. Nadia Lopez

Founding Principal of Mott Hall Bridges Academy, Dr. Nadia Lopez is pioneering a leadership path showing underprivileged communities creating positive institutions that have global impact. Due to her work in education, Nadia has appeared on the *Ellen Show,* visited President Obama, and received the Medal of Distinction from Barnard College. In 2015, a HONY fundraiser raised $1.4 million to provide Nadia's students college trips and scholarships. Dr. Lopez is also a Black Girls Rock Change Agent, TED Speaker and the author of *The Bridge to Brilliance,* an inspirational account of the creation of a groundbreaking inner-city middle school in Brooklyn, New York. Understanding the power of programming, Nadia continues to impact the lives of children through her "She Is Me" and "I Matter" initiatives, which have served thousands of youth throughout Central Brooklyn by providing workshops, forums and mentoring. Nadia continues to influence and inspire the world through her company The Lopez Effect, which offers a blueprint for personal and organizational success.

Michael Soskil

Michael Soskil, the 2017–2018 Pennsylvania Teacher of the Year, is determined to make learning meaningful for every child and to empower students and teachers as positive change agents in their communities. As an elementary science teacher at the Wallenpaupack South Elementary School, he inspires young scientists to use their curiosity and learning to make the world a better place. His students have gained international attention for initiatives that have included designing a bridge for a rural village in Africa, connecting with students in Kansas and Greece to provide clean drinking water for hundreds of families in the Kibera slum of Nairobi, and starting a Distance Teaching Project that expanded to include videos from students on six continents sharing their learning with others. In 2012, Michael's innovative work was recognized by the White House and US National Science Foundation with the Presidential Award for Excellence in Math and Science Teaching. In 2016, he was named a Global Teacher Prize finalist and one of the top ten teachers in the world by the Varkey Foundation. His message of student empowerment and teaching through empathy has been shared with teachers, policy makers, businesspeople and students around the globe. Outside the classroom, he serves as an advisor to several NGOs and non-profit organizations focused on global education, and sits on the governing board for the Pennsylvania Teachers Advisory Committee, which is providing a pipeline to connect teacher voice education decision makers.

Koen Timmers

Koen Timmers is researcher and lecturer at PXL University College in Hasselt, Belgium. He was a Top 50 finalist in the Global Teacher Prize 2017 and 2018. In 2000, he launched his own online school Zelfstudie.com; it currently has 20,000 students. He founded the Kakuma project in which he managed to connect 100 global educators who now offer free education to African refugees

via Skype. Koen is a Microsoft Expert Educator Fellow and has been speaking about technology-enhanced learning across four continents. He is one of the TeachSDGs taskforce members. He won the HundrED 2017 award as one of the global education innovators. He has launched several global educational projects like the Climate Action project, which is supported by Dalai Lama, Greenpeace and The Jane Goodall Foundation.

Acknowledgements

If it weren't for the Global Teacher Prize (GTP) and the Varkey Foundation, none of us would have met each other, let alone collaborated on a book. Mr. Sunny Varkey's vision of raising the status of the teaching profession through the Prize, and supporting the work of finalists to bring about positive change in international education systems, made this possible. His generosity knows no bounds to make sure that every child has a proper education. Vikas Pota, CEO of the Foundation, gave us the confidence to pursue our dream of making a global impact. His enthusiastic support sustained us through times when this project seemed overwhelming. Great teams often have great coaches, and Alice Cornish served that role for us. She pushed us to think deeper about issues and to examine each topic from multiple points of view. The entire Varkey team was instrumental in helping this book become a reality, especially Cate Noble, Jonathan Simons and Nicholas Piachaud. We can't thank them enough.

Klaus Schwab's book *The Fourth Industrial Revolution* inspired us to write about the role of teachers in these unprecedented times. Education is often mentioned as a solution to society's problems, but too often the perspectives on how to do this are limited and lack the critical voices of those who are implementing policy at the classroom level. We are eternally grateful to Mr. Schwab for supporting the inclusion of teacher voice in this discussion.

Andreas Schleicher's commitment to improving education is obvious to anyone who has the pleasure to meet him. As former GTP finalists, each of us has had that pleasure. Few individuals on the planet understand the intricacies and interconnectedness of international educational policy as deeply as he does. Although he is far from the classroom as Director of Education and Skills at Organisation for Economic Cooperation and Development (OECD), he is a true champion

of teachers. We are deeply grateful for his support and willingness to be a part of this endeavor.

Thank you to the experts and researchers that added their voices to this book. Your guidance and knowledge has pushed us in our classrooms and have enhanced the profession.

Most importantly, this book would not be possible if it weren't for the examples of teachers doing amazing work around the globe. We were constantly inspired by our peers, especially other GTP finalists in the Varkey Teacher Ambassador network. Each of you, and millions of others around the globe who have not yet been recognized, are changing the world every day, one student at a time. We are humbled and honored to share some of your narratives, and we hope those who read will be as inspired by them as we were. Thank you for your tireless commitment to our next generation.

Lastly, we would all like to thank a few people individually.

Armand Doucet

I would never had tried to write a book if it wasn't for the confidence and support of my loving wife Nicole. She sacrifices for me to chase my dreams of trying to make the world a better place. My two beautiful girls, Audréanne and Arianne, are the reminder every day why education matters so much. Their curiosity and zest for life need to be nurtured throughout their lives. Our future is with our children; we owe it to them to do our best. Without my wife and kids cheering me on, I would not have had this chance to collaborate with this incredible team of authors.

Thank you to my parents for letting me chase my passions throughout my childhood. I owe you both an unpayable debt. I have been lucky enough to have three siblings that I try to imitate every day. My brother Pierre, you have inspired me with your courage; this book has a lot of you in it. My sister Marianne, I wish that everybody in this world could have as kind a heart as you have; thank you for your support and advice throughout this process. To my sister Lillie, you are and always will be the teacher I try to imitate in my own classroom. To my close friends, Eddie, Matt, Denny and André: thank you for keeping me sane.

Lisa Hrabluk and Wicked Ideas, thank you for pulling out all stops to put New Brunswick on the map and helping me out at every turn. This book never makes your book club without your honest help.

I would like to thank the New Brunswick Department of Education, in particular our Deputy Minister John Mclaughlin, Assistant

Deputy Minister Chris Treadwell and Director of Curriculum Kimberly Bauer for their support and advice as I tried sorting through my ideas. To the Anglophone East School District, in particular Superintendent Gregg Ingersoll. To Liz Nowlan, Mario Chiasson, Diane Gillis, Liz Nowlan and Pamela Wilson, thank you for giving me the opportunity to become a better teacher and for your incredible support.

Last but certainly not least, I would like to thank all my colleagues, past and present. They are a wonderful group of teachers who keep pushing the boundaries of what our profession will look like in the future.

Jelmer Evers

Writing, teaching, traveling. It is all time consuming. There is so much to read, and inspiration comes and goes. Staying up late, weekends away. That requires a lot of flexibility and understanding. I'd like to thank my wonderful loved ones – Ilja, for being so supportive and understanding. But also for being an inspiration in education yourself. I don't know anyone who exemplifies what we need in education as well as you. And my two boys, Finn and Syp, who have had to put up a lot from me, but are always curious of what daddy is up to now. I'm doing this for you.

My contributions to this book have been inspired by so many people. My wonderful colleagues at UniC, especially the Social Sciences Department: Rianne Neering, Hanneke van der Graaff, Margit Pothoven, Nico Jongerius and Koen Assman. What I learned by working with you has been the foundation for my thinking and writing. And of course, my students, who have to put up a lot from me. And thanks for being so understanding when I'm off to a faraway country to do "something" with education.

I'd also like to thank David Edwards and Fred van Leeuwen and all of my colleagues at Education International and national unions who are an inspiration in their leadership and activism and who have opened up my eyes in so many ways. We stand stronger together. Thank you, Dennis Shirley, Andy Hargreaves, Carol Campbell for showing us the way and for just being good friends; Dick van der Wateren for putting the alternative into practice, the hardest part; Arjan van der Meij and Per Ivar Kloen, the maker boys, who exemplify the joy and professionalism of our profession; and finally, my flip brother in arms in writing and in teaching, Rene Kneyber, for starting it all.

Elisa Guerra

Writing this book in collaboration with a team of outstanding teachers and dear friends has been one of the most rewarding experiences in my professional life. I am deeply grateful to Armand, our leader, whose vision and drive brought the team together – and the book to life. Mike was always generous with his time and expertise and, as a native speaker and seasoned writer, provided sensible feedback to my chapter. I had previously worked with Jelmer when he invited me to author a vignette for *Flip the System*, the book he edited in 2015. His professional connections and clever insights proved invaluable for the group. Koen was the tech-savvy one that powered the survey directed to the global teachers, which was so vital for my chapter, and sent me updated results and summaries every time I asked. I learned so much from Nadia, both from her book *The Bridge to Brilliance* and from the lively discussions we had in Toronto. It was uplifting – and humbling – to have the chance to interact with these incredible educators. I was on my tiptoes all the time, trying to reach to their level.

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Dr. Nadia Lopez

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reflective of the skills needed to thrive within the Fourth Industrial Revolution: collaboration, critical thinking and communication. To the team at the Varkey Foundation, thank you for the opportunity to serve as a global ambassador and creating an extended family that has allowed me to learn from phenomenal teachers who embody education excellence. To my fellow Varkey Teacher Ambassadors, you are all phenomenal and make me proud to be an educator.

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Michael Soskil

Teaching is the greatest profession in the world. Not only do we get to make a difference in the lives of others every day, but we get to teach the next generation how to change the world for the better. My students constantly remind me that the solutions to all of the world's problems are trapped inside the passions of our children. For their inspiration and for making my job so much fun, I thank them.

Throughout my years in education, my professional growth has been fueled by the outstanding teachers around me. During our work together, my co-authors forced me to think more deeply about education issues than I ever have before. Within Wallenpaupack, my home district and through an online professional learning network (PLN) that spans the globe, I am pushed beyond my comfort zone by the excellence of those to whom I am connected. Thank you, Patti Duncan, for starting me on this journey by teaching me the power of online collaboration. My contribution to this book would not have been possible without all those in my PLN. Many of the narratives of their amazing work are included in my chapters. Many more examples of exceptional dedication to students had to be left out due to space constraints. I am appreciative to every one of these educators, and to

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Koen Timmers

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I also want to thank PXL-education Hasselt, CVO de Verdieping, executives Marc, Wouter, Maddy and colleagues for supporting me to push boundaries in my classroom.

No global initiatives happen without strong connections and communities. I'd like to thank my global friends and PLN in the Microsoft in Education, Varkey Teacher Ambassador, MTGS and NNSTOY communities. Also, my co-authors inspired me a lot and offered a

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Introduction

Armand Doucet and Jelmer Evers

The six of us from all over the globe were sitting in a room in Toronto at the beginning of what turned out to be a very intense 2-day session, where we explored the state of the world and the future of education. As we were just settling in, the question "Why are we here?" came up. Why are we here writing this book? As we each took our turn, a pattern emerged. Each of us basically answered, "For our children." We are not only teachers, but parents as well. We are also profoundly worried about the current state of the world in which our children will grow up. One by one, we listed all the challenges we saw around us: devastating climate change, endemic inequity, rising inequality, populism and authoritarianism, and the resulting risk of conflict. What can education achieve? How should it change? What is our role in this as teachers?

It wasn't just an academic conversation. These global challenges reflect real problems from our everyday practice in our classrooms. These also reflect the hopes and fears of our students as they too struggle with what the future will hold for them. We all teach in very different settings. Mike Soskil and Nadia Lopez both hail from the United States for example, but one teaches in a conservative rural setting, whilst the other is a principal in a deprived urban area. But even when we do teach in more affluent environments, we all know that every student brings their whole being into the classroom and that the world – whether it be local or global – always influences and changes how they feel, act and think. Each individual student is a new independent and constantly changing variable in an ever-changing context. This nuance often gets lost when education is discussed, especially at the global policy level.

"First, we wanted to write this book for our children. Second, we wanted to get our teachers' voice heard." Emphasizing the nuances of our everyday practice. We are not academics, but practitioners. We are

however academically qualified, inclined and evidence informed. This book, though, is not a research study, but it is a reflection of our experiences and the experiences of many of our colleagues. Those experiences, though, are backed up by a wealth of research and knowledge of the world. Teachers exemplify three important Aristotelian virtues: *Episteme, Techne,* and *Phronesis*. *Episteme* is the knowledge of universal truth (science), and *Techne* is the ability to make things. But what Aristotle regarded as the highest intellectual virtue – and what captures the teaching profession best – was what he called *Phronesis*, practical wisdom.[1] We need wisdom to make judgements about what is desirable or good again and again. To say it in more popular terms: we need more practical knowledge in education, and we want to strengthen that voice with this book.

Between the six of us, we already knew so many inspirational examples of teachers making a difference worldwide. So, while the state of the world sometimes gives us reason for despair, stories about empowered students and inspiring teaching give us hope. In that room in Toronto, we were experiencing a feeling of standing at the precipice – a fork in the road – where we sensed that the teaching profession could be crucial in leading the way forward. The teaching profession possesses those traits and moral purpose that might be an inspiration for other segments of society.

There has been a wealth of literature on the extraordinary era of change we are experiencing. The book that started us on this road was *The Fourth Industrial Revolution* by Klaus Schwab, Founder and Executive Chairman of the World Economic Forum (WEF).[2] The main thesis of the book is that we are living in a time of unprecedented change, a Fourth Industrial Revolution driven by new technologies. Automation and globalization have already profoundly changed global society from the 1980s onwards, and these changes are now happening exponentially. We are indeed standing at the precipice. And whether we are up to the task to deal with these challenges remains to be seen, according to Schwab. But he is optimistic.

Our book takes us on a dazzling tour, looking at a wide array of technological breakthroughs and possibilities. The difference with the

1 Biesta, G. (2007, February). Why 'What Works' Won't Work: Evidence-Based Practice and the Democratic Deficit in Educational Research. *Educational Theory*, 57(1): 1–22. doi: 10.1111/j.1741–5446.2006.00241.x.

2 Schwab, K. (2017). *The Fourth Industrial Revolution*. UK: Penguin.

previous revolutions is that this one combines the physical, digital and biological worlds. Schwab identifies 21 deep shifts, citing examples like Implantable Technologies, Big Data, Artificial Intelligence (AI), Robotics, 3D-Printing, Neurotechnologies and Designer Beings. Some of these are already having a big impact on our society, indeed, on us personally. The six of us writing this book wouldn't be where we were, sitting in that room in Toronto, if we hadn't embraced some of these technological changes, which we will explore further in our chapters. But Schwab rightfully addresses the positive and negative sides of these technological changes. For example, Big Data and AI might enable us to make better and faster decisions, but there are also increasing worries about privacy, existing biases, accountability and trust. Are algorithms really as neutral as they are portrayed to be?

Since the publication of *The Fourth Industrial Revolution,* things haven't improved. It is increasingly clear that globalization and automation are linked to the political, economic and social problems we are facing today.[3] Where the world should be coming together, it is becoming more authoritarian, not more democratic. We are living in an era of *democratic recession* which increasingly is starting to resemble the 1930s.[4] According to *Freedom House*'s annual report – in 2017 ominously titled *Populists and Autocrats: The Dual Threat to Global Democracy* – 2016 was the 11th year of consecutive decline in global freedom.[5] Where we should be fighting inequality and inequity, these gaps have only widened. Allegedly, the richest 62 people of the world now own more than the bottom 50 per cent of the world population.[6] And although the Paris climate accords were a monumental historical achievement, the question remains to be seen if we can follow up on the commitment. The International Monetary Fund in its World Economic Outlook 2017 reported that with the current scenarios, the poorest countries will be hit hardest by climate change.[7]

3 Rodrik, D. (2017, June 15). Populism and the Economics of Globalization. *Draft*. Cambridge.

4 Wolf, M. (2017, September 19). Democracy and Capitalism: The Odd Couple. *Financial Times*.

5 Puddington, A., & Roylance, T. (2017). *Populists and Autocrats: The Dual Threat to Global Democracy: Freedom in the World 2017*. London: Freedom House.

6 Hardoon, D. (2017). *An Economy for the 99%: It's Time to Build a Human Economy That Benefits Everyone, Not Just the Privileged Few*. Oxford: Oxfam International.

7 International Monetary Fund. (2017, October 2). *World Economic Outlook 2017: Seeking Sustainable Growth Short-Term Recovery, Long-Term Challenges*. Washington: IMF.

As Klaus Schwab rightly says, we need to build new institutions, new governance, new networks and new leadership that foster trust and can create sustainable change in our societies. Crucially, we need to evaluate new ways to educate our children: "In the end, it comes down to people, culture and values." He identifies four different types of intelligences that he sees as crucial in overcoming the enormous challenges ahead:

> **Contextual (the mind) intelligence** is about how we understand and apply our knowledge. Solutions to 'wicked problems' like climate change "require collaboration across boundaries with leaders from business, government, civil society, faith, and academia." **Emotional (the heart) intelligence** is about "how we process and integrate our thoughts and feelings and relate to ourselves and to one another. Skills like self-awareness, self-regulation, motivation, empathy and social skills are essential." **Inspired (the soul) intelligence** is about "how we use a sense of individual and shared purpose, trust, and other virtues to effect change and act towards the common good." **Physical (the body) intelligence** is about how "we cultivate and maintain our personal health and well-being and that of those around us to be in a position to apply the energy required for both individual and systems transformation."

And of course, there is much hope to be found. As the late Hans Rossling never tired of pointing out in his presentations, the world has seen tremendous progress. More than half of the world's' population has risen out of poverty. Recently, nations of the world created a roadmap to a sustainable future at the 2015 World Education Forum, hosted by the Republic of Korea. Of the 17 Sustainable Development Goals (SDG), Education (SDG4) was specifically mentioned as a foundation for change. Between 19 and 22 May 2015, over 1,600 participants from 160 countries, including over 120 ministers, heads and members of delegations, heads of agencies and officials of multilateral and bilateral organizations, and representatives of civil society, the teaching profession, youth and the private sector, adopted the Incheon Declaration for Education 2030 where SDG4 was further specified. In September 2015, all Sustainable Development Goals were adopted at an in historic meeting at the United Nations (UN).

But we still have a very steep uphill climb ahead of us. According to the latest figures in 2015 by the United Nations Educational, Scientific and Cultural Organization (UNESCO), there are 264 million

primary- and secondary-age children and youth out of school. Less than one in five countries guarantee 12 years of free and compulsory education. Only 66 per cent of countries have achieved gender parity – an equal number of girls and boys – in primary education, 45 per cent in lower secondary and 25 per cent in upper secondary. Between 2009 and 2012, only 7 per cent of teacher education programs covered education for sustainable development.

The education share of total aid for the Global South fell for six consecutive years, from 10 per cent in 2009 to 6.9 per cent in 2015. Education was more exposed to the risk of corruption than even the construction industry in the European Union in the period 2009–2014. These are just some of the facts showing a light on the enormity of the challenge ahead.

Too often, education by itself is seen as the answer to all these challenges. We have lost count how many times we've seen bridging the "skills gap" in an automated future as the *deus ex machina* to these challenges. Just like technology, education isn't the solution to all our political, social and economic challenges. It does have a crucial part to play though.

This challenge calls for a holistic view of education. We need to look at not only what happens in the classroom, but also how we design our educational system. Renowned scholar Dennis Shirley has laid down the need for this in his book *The New Imperatives for Educational Change.*[8] In it, he offers five old and five new imperatives for educational change. The old ones will sound familiar to many teachers, we have felt the brunt of these forces in our classroom.

Here then, are the old imperatives. The *ideological imperative* that emphasized market competition, testing and standardization as levers to improve schools – despite the absence of evidence to support these directions; the *imperial imperative* that projected this ideology onto other schools and systems as the best way to move forward, even when those other systems were already succeeding by employing different ways to organize their work; the *prescriptive imperative* that mandated the daily work of educators from higher levels of school bureaucracies; the *insular imperative* that overloaded educators with so many policy demands that their ability to learn from other schools and systems has been seriously impeded; the *instrumental imperative* that denied students and teachers in relation to their economic contributions, with a concomitant disregard for values of compassion, solidarity or service.

8 Shirley, D. (2017). *The New Imperatives of Educational Change.* New York: Routledge.

Shirley proposes five new imperatives which should guide a new wave of educational change. Again, these will ring true to many teachers. The *evidentiary imperative*: collaboration, trust and professionalism are key to high achievement. The *interpretive imperative*: we should not discard data and evidence, but it must engage with evidence on all levels. Policies and practice must always be contextual and engage the profession and the public. The *professional imperative*: instead of teachers having to do as they are told, they have to be professionals who are able to make judgements. The *global imperative*: instead of the teacher being alone in the classroom, we have to strive for global learning in education. Finally, the *existential imperative*: what is education for? We need to educate the whole child and provide a holistic curriculum and experience.

Just like Klaus Schwab, Dennis Shirley talks about the promise of the present moment. There is reason for hope and optimism. All across the world, teachers are finding new ways to ensure that their students receive an education that prepares them for the Fourth Industrial Revolution. Not only in the classroom, but also outside of it. Whilst we have tried to be comprehensive, this book is not meant to be exhaustive. We've tried to find our voice and bring our experiences to bear around topics that we as teachers think are important. The chapters have an individual voice, but are a collective effort, as we all contributed to each other's chapters.

In Chapter 1, "Education in a time of unprecedented change," Michael addresses the challenges we face in a world rapidly changing due to technology. He stresses the need for the best parts of humanity and empathy to remain at the core of our education systems, and focuses on the importance of teachers in making this happen.

In Chapter 2, "Education today: a collection of snapshots," Elisa, rather than trying to explain education today from a single perspective, will present a collection of snapshots, taken from different narratives and research data. We will hear the voices of teachers and experts from around the world as they try to frame education at the threshold of the Fourth Industrial Revolution.

In Chapter 3, "Overcoming equity gaps in and through education," Michael describes the dangers of inequity inside and outside our schools and examines ways to help close those gaps. He explains how, by using data well and looking at qualitative narratives that show the lived experiences of marginalized populations, we can scale great teaching practices will help move our society in the right direction.

In Chapter 4, "Teach ME: the learner profile," Armand will provide teachers with an overview of core knowledge, literacies, competencies

and character for the Fourth Industrial Revolution classroom and a practical guide to introducing this holistic approach.

In Chapter 5, "The power of learning," Nadia takes us on her journey to give us insight on how we get teachers ready for the Fourth Industrial Revolution and educate teachers for Dennis Shirley's New Imperatives for Educational Change. Teachers, she argues, must be lifelong learners.

In Chapter 6, "Contextualizing personalization in education," Armand will explore the rise of personalized education, and he will provide a practical template from classrooms around the world on how to proceed down this path in an ethical manner.

In Chapter 7, "Evolution of technology in the classroom," Koen shares with us how he became one of the most innovative teachers in the world. His examples, as well as many from his peers around the world, showcase that great pedagogy with a proper use of technology can enhance the learning experience.

In Chapter 8, "Flip the system," Jelmer will discuss systemic change. He will explain how, by flipping the system, we can change education from the ground up. That will take professionalism and also activism by teachers to help build those new systems. We need to embrace a new paradigm: the networked teacher.

You will find that the six of us agree on many things and disagree on others. Each of us brings a different perspective to the discussion of education in the Fourth Industrial Revolution. During our work on this book, there were disagreements – often heated and intense, but always respectful. Through the process, each of us has grown as individuals and professionals. This mirrors education. It is complex, messy and beautiful. Passionate teachers having professional discussions about what is best for kids leads to a better education system. We hope that this book leads to positive change, while serving as a catalyst for others to have necessary complex conversations. We are standing at the precipice. The future is unknown. Each of us has shared our most passionate ideas on education, channeling our experiences and the voices of inspiring educators from around the world. Individually, each of these chapters offers a path forward. Collectively, they offer a vision of how education can lead us through an unknown future to a place of peace and prosperity.