THE EDUCATIONAL INTELLIGENT ECONOMY

Big Data, Artificial Intelligence, Machine Learning and the Internet of Things in Education

Edited by
Tavis D. Jules
Florin D. Salajan

THE EDUCATIONAL
INTELLIGENT ECONOMY

INTERNATIONAL PERSPECTIVES ON EDUCATION AND SOCIETY

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THE EDUCATIONAL INTELLIGENT ECONOMY: BIG DATA, ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND THE INTERNET OF THINGS IN EDUCATION

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An extremely important addition to the Comparative and International Education literature that stands out for its comprehensiveness and erudition. The topics covered here are not only thematically diverse, but extend the boundaries of scholarly inquiry by raising fundamental questions with which all members of the Comparative and International Education scholarly community must seriously engage. *Irving Epstein, Ben and Susan Rhodes Endowed Professor in Peace and Justice, Chair of Educational Studies, Director of the Center for Human Rights, Illinois Wesleyan University*

This book sparkles with insights about the emerging Educational Intelligent Economy and the challenges that new, fast-paced, commodified and borderless technologies are posing to policymaking and governance. This is the new "go-to" reference for my own explorations of big data, machine learning, AI and predictive intelligence that I have been waiting for! *Radhika Gorur, Associate Professor, Deakin University. Australia*

The book offers readers "concerned descriptions" of the current developments and provides valuable and timely contributions for exploring dilemmas, risks and potentialities of the dynamics of the Educational Intelligent Economy. A very insightful knowledge repertoire is finally furnished to interfering with and possibly challenging the existing power asymmetries in education research agendas and global policy. *Paolo Landri, Deputy Director and Senior Researcher, Institute of Research on Population and Social Policies, National Research Council in Italy*

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Vasudha Chaudhari is a PhD candidate at the Institute of Educational Technology (IET), The Open University, UK. Her research is funded by the Leverhulme doctoral scholarship program, under the Open World Learning project (https://iet. open.ac.uk/projects/owl). Her research interests include technology-enhanced professional learning and design-based research methodology. Her dissertation research focuses on the development and implementation of technological scaffolding on proactive work behavior of finance professionals during times of uncertainty. As part of her PhD, Vasudha is using design-based research methods for developing an LiU (Learning in Uncertainty) app, that supports professionals' proactive work behavior through personalized self-regulated learning strategies to be used during periods of uncertainty. She has conducted impact events and workshops at the Chartered Institute of Securities and Investments, London to help finance professionals recognize the need for self-regulating their

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Tavis D. Jules is Associate Professor of Cultural and Educational Policy Studies at Loyola University Chicago, specifically focusing on Comparative and International Education and International Higher Education. His vast professional and academic experiences have led to research and publications across the Caribbean and North Africa. He is President of the Caribbean Studies Association, Book Review Editor for the *Caribbean Journal of International Relations* and an International Institute of Islamic Thought Fellow. His most recent books include: *Educational Transitions in Post-Revolutionary Spaces: Islam, Security and Social Movements in Tunisia* (with Teresa Barton, Bloomsbury 2018); *Re-Reading Education Policy and Practice in Small States: Issues of Size and Scale in the Emerging Intelligent Society and Economy* (with Patrick Ressler, Peter Lang 2017); and *The New Global Educational Policy Environment in the Fourth Industrial Revolution: Gated, Regulated and Governed* (Emerald 2016).

Christopher Kirchgasler is Assistant Professor of Curriculum and Global Studies at the University of Wisconsin-Madison. His work examines the historical, ethnographic, and comparative qualities of schooling, particularly as they relate to notions of inclusion, equity, and justice. His research directs attention to how contemporary transnational school reforms are "haunted" by a coloniality of knowledge that defines who and what are seen and acted on as the "problems" of individual and social development. He has co-edited *A Political Sociology of Educational Knowledge: Studies of Exclusion and Difference* (Routledge 2017) and his work has been published in the *American Educational Research Journal*.

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Bjorn Nordtveit is Visiting Faculty at Zhejiang Normal University, and Associate Professor at the University of Massachusetts Amherst since 2011, after serving for five years as Research Assistant Professor at the Faculty of Education, University of Hong Kong. Before joining academia, he worked for 12 years (1994–2005) with UNESCO in the Lao PRD and with the World Bank (mostly in West African countries) on non-formal youth and adult education. His research focuses on three areas: (i) aid effectiveness in education and development, including public–private partnerships and integrated service provision; (ii) child protection in contexts of adversity; and (iii) critical and alternative epistemologies, including critical autoethnography, decolonial methods, and critical discourse analysis. His most recent book is *Schools as Protection? Reinventing Education in Contexts of Adversity* (Springer 2016). Bjorn Nordtveit is the Editor of the *Comparative Education Review* (2013–2023).

Fadia Nordtveit's (previously Fadia Hasan) research on international communication, global youth activism, new media technologies, and social change led her to found The BGreen Project, an international nonprofit that connects and mobilizes global youth to collaborate in building new discourses on environmental action and sustainable social change. Her academic-community engaged research connects the global north and south and has led to the book titled *Participatory Action Research and the Environment: The BGreen Project in the U.S. and Bangladesh* (Routledge 2017). Fadia's goals as a Researcher and Educator are aligned with a holistic approach that aims to connect networked people and communities in an interdisciplinary, unique and glocal academic universe to produce bigger, richer, and more inclusive outcomes.

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Robin Shields's research analyzes the globalization of higher education, using social network analysis and related research methods to understand shifting relationships between institutions, individuals, and nation-states. He has applied these methods to several domains, including international student flows in higher education, social media networks, and research collaboration. Robin has acted as Principal Investigator for research funded by the Higher Education Academy and Leadership Foundation for Higher Education. He is also Co-Investigator on an ESRC-funded project studying cross-cultural perspectives on Global Citizenship in Higher Education. Robin teaches on the DBA in Higher Education Management, the Education Doctorate, and several MA and undergraduate programs.

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FOREWORD

Gita Steiner-Khamsi

This book breaks new grounds on several fronts.

Semantically, the authors of this book flesh out a vocabulary that, until recently, was only mastered by a small group of technology experts. The Fourth Industrial Revolution, Intelligent Economy, Big Data, Information Technology (IT), Operational Technology (OT), and the Internet of Things (IoT) connecting IT and OT, are but a few of the terms associated with data mining, machine learning, and artificial intelligence. A clear indication of the professionalization of this new area of research is the boundary work that the experts currently undertake vis-á-vis non-experts as well as within themselves. As a result of the expertization process, new journals have been launched, associations established, and books produced. Unsurprisingly, the terms associated with this rapidly expanding field of research are currently undergoing a remarkable semantic differentiation process. The term "data" has become ubiquitous to the extent that experts have started to break it down into 13 forms or more: big data, machine data, dark data, real-time data, etc. (Jules, Chapter 1 in this volume).

Analytically, the authors have followed Gillespie's (2014) advice: "sociological analysis must not conceive of algorithms as abstract, technical achievements, but unpack the warm human and institutional choices that lie behind these cold mechanisms" (as cited in Williamson, 2016, p. 8). Hyped as innovations and prerequisites for the "intelligent economy," humans and institutions in the education sector increasingly use these technologies in governance, teaching and learning, and testing. Drawing on the rhetoric of knowledge-based economies, governments have partnered with businesses to take the digital revolution to scale, or as Jules (2019) has astutely phrased it:

> The transition from governments to markets and the evolution of market-based economies to knowledge-based economies imply that the new sources of wealth are intelligence in the form of information housed in clouds, harnessed through data procedures, broken down into uniquely tailored bites, and off to the highest bidder. (Chapter 1 in this volume)

Clearly, the fast advance of digitalization and datafication in education has generated new transnational alliances to "tame" the digital transformation process (Salajan, Chapter 11) or to actually propel it at global scale (UN Secretary General, 2019), respectively.

Finally, several authors of the book reflect on the, mostly negative, transformative power of digitalization and datafication on learning, governance, as well as

educational policy and planning. From a sociological systems-theory perspective, any fundamental change constitutes an irritation which requires systems to learn, adjust or, to use a term that resonates with this community of experts, to recalibrate. Without any doubt, the digital revolution qualifies as a fundamental change. Therefore, the questions that arise are: What has the digitization revolution done to education? Who has benefited, who has lost as a result of system learning, adjustment, or recalibration?

Two fundamental principles of financial transaction are important to bear in mind. First, if the consumers do not need to pay for a product, they themselves become the product. The "prosumer" phenomenon in data mining (Ritzer & Jurgenson, 2010), that is, the blurred line between consumer and producer, has been scrutinized in several chapters of the book. Second, there is a particular logic of the economic system that is reflected, and exacerbated, in the digital revolution that deserves to be unpacked. Even though digitalization and datafication in education may have salutary effects in some areas of education, it is the underlying for-profit habitus that has detrimental effects and is in need of theorizing.

In many countries, it is the businesses and international organizations that are the main actors steering the digital revolution in the education sector. A closer examination of their collaboration reveals the trend toward standardization, testing, and internationalization (Steiner-Khamsi, 2016; Steiner-Khamsi & Draxler, 2018). A few comments on these trends may be in order here.

Essentially, businesses rely on an economy of scale to sell their products and services. Standardizing learning outcomes in the form of OECD PISA's twenty-first century skills, testing them at the end of lower secondary and eventually at the end of primary school, and administering the test to as many countries or educational systems as possible, is good business. Big Data – defined by its volume, velocity, and variety – helps to continually test and refine the product in order to sell tailor-made variations or adaptations thereof to a large number of customers.

Furthermore, directing attention to the intersection of public/national and private/global is likely to yield new insights and open up new avenues of research: by default, public means local or national, and private may operate at all levels, including at the international level. A project of the modern nation-state, compulsory education is national in terms of accreditation, teaching content, and language of instruction. In contrast, private providers are able to orient themselves and operate both at a local, national and an international scale. For example, the ubiquitous talk of global markets and the attractiveness of international student mobility has helped boost the attractiveness of international private schools and transnational accreditation in education. If the trend continues, "international" is likely to become increasingly positively associated with cosmopolitanism and 'national' with backwardness and parochialism. In an era of globalization, the national orientation has become in and of itself a burden to governments. In other words, public (national) education is not doing well. The digitalization of education is deepening the crisis of public education, because national governments need to rely on the expertise, products, services

of the private sector to implement the digital revolution. They hire companies that, in the name of innovation, constantly generate new datafication and digitalization needs, reach out to new clienteles, and create an ever-expanding market. By default, the private sector thinks global, because thinking big enables them to transfer, and sell, one and the same product across the globe.

Arguably, it would be too narrow to think of the private sector merely as a provider of products and services. The private sector has become a major policy actor and is influential in setting reform agendas and formulating policies. As Lubienski (2019) points out, we are dealing nowadays with a "market place of ideas" and an "overproduction of evidence" (Lubienski, 2019, p. 70). He succinctly states:

> Into the chasm between research production and policymaking, we are seeing the entrance of new actors – networks of intermediaries – that seek to collect, interpret, package, and promote evidence for policymakers to use in forming their decisions. (Lubienski, 2019, p. 70)

The private sector has not only made itself indispensable for amassing data across national boundaries but also for interpreting it. It does so for its greater project of an "intelligent education," that is, an education that is informed by what works and what does not work. Needless to state, from the perspective of policy borrowing research, it is cause for alarm that innovations are uncritically transferred from one context to another thereby disempowering local actors and local solutions.

In other words, datafication and digitalization per se are not the problem. On the contrary, there are many positive uses that come to mind. For example, one may use data for advocacy purposes (registering the number of internally displaced out-of-school children and youth) or for digitalizing knowledge products and making them openly available for free. The issue is that the Fourth Industrial Revolution is at the mercy of for-profit companies who control the knowledge, means, and global networks to scale up digitalization and datafication to keep themselves in business.

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