ResearchGate

See discussions, stats, and author profiles for this publication at: https://www.researchgate.net/publication/336267336

Psychodata: disassembling the psychological, economic, and statistical infrastructure of 'social-emotional learning'

Article *in* Journal of Education Policy · October 2019

DOI: 10.1080/02680939.2019.1672895

CITATIONS
0

READS
196

1 author:



Ben Williamson
The University of Edinburgh
51 PUBLICATIONS **739** CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:

Learning Machines: Big data, software & education View project

Education Governance and Social Theory (Bloomsbury 2018) View project

All content following this page was uploaded by Ben Williamson on 07 October 2019.

The user has requested enhancement of the downloaded file.

Psychodata: disassembling the psychological, economic, and statistical infrastructure of 'social-emotional learning'

Ben Williamson, University of Edinburgh, ben.williamson@ed.ac.uk

Author manuscript of article published in *Journal of Education Policy*:
https://doi.org/10.1080/02680939.2019.1672895

Abstract Psychology and economics are powerful sources of expert knowledge in contemporary governance. Social and emotional learning (SEL) is becoming a priority in education policy in many parts of the world. Based on the enumeration of students' 'noncognitive' skills, SEL consists of a 'psycho-economic' combination of psychometrics with economic analysis, and is producing novel forms of statistical 'psychodata' about students. Constituted by an expanding infrastructure of technologies, metrics, people, money and policies, SEL has travelled transnationally through the advocacy of psychologists, economists, and behavioural scientists, with support from think tank coalitions, philanthropies, software companies, investment schemes, and international organizations. The article examines the emerging SEL infrastructure, identifying how psychological and economics experts are producing policy-relevant scientific knowledge and statistical psychodata to influence the direction of SEL policies. It examines how the OECD Study on Social and Emotional Skills, a large-scale computer-based assessment, makes 'personality' an international focus for policy intervention and 'human capital' formation, thereby translating measurable socio-emotional indicators into predicted socio-economic outcomes. The SEL measurement infrastructure instantiates psychological governance within education, one underpinned by a political rationality in which society is measured effectively through scientific fact-finding and subjects are managed affectively through psychological intervention.

Keywords *behavioural economics, data, economics, infrastructure, psychology, social-emotional learning*

Psychologists, behavioural scientists and economists have established remarkable positions of expertise, authority and influence in contemporary societies (Rose 1999; Fourcade 2018; Whitehead et al 2018). In particular, increased political concerns with the emotions, well-being and behaviours of individuals and populations, as healthy citizens and productive labour, has led to growing interest in the objective measurement and governance of subjective states (Davies 2018). Mirroring the increasing governmental mobilization of scientific knowledge about

the body, its feelings, and how to enumerate and value them, within education a 'psycho-economic fusion' (Bates 2017) of psychological, economic and behavioural expertise has begun to direct policy attention to measurements of students' behaviours and emotions, and their use as proxy indicators to predict socio-economic outcomes (Ecclestone 2017). Education policy in many parts of the world is increasingly focused on the development and measurement of students' 'social-emotional learning' (Humphrey 2013), a term denoting 'non-cognitive skills' or 'non-academic competencies' such as 'grit,' 'resilience,' 'growth mindset' and 'character,' as well as other 'personal qualities', 'personality traits' and 'psycho-emotional' behavioural determinants (Osher et al 2016). Underpinning many of these efforts is the construction of an infrastructure of measurement that is intended to generate new data and evidence about social-emotional learning (SEL). These data are being positioned as a new form of psycho-economic knowledge which may then be mobilized to advocate and advance new SEL policies, interventions and practices in education systems globally.

This article provides an analysis of the emerging infrastructure of SEL measurement, identifying how psychological and economics experts, together with think tank coalitions, philanthropic funders, software companies, investment schemes, and international organizations are coalescing around the production of systems to generate policy-relevant data and statistical knowledge and thereby influence the direction of SEL policies. By 'disassembling' the psychological, economic and statistical infrastructure of SEL into its key component parts, and tracking some of its ongoing evolution and mutation, the analysis reveals the centrality of data infrastructures to the formation and enactment of contemporary forms of policy and governance. In particular, it demonstrates how social-emotional learning is being positioned as a proxy for socio-economic value, as international organizations seek statistical data on the human psychological characteristics and 'emotional intelligence' that are required by labour markets to maximize the productivity potential of new computer-based automated systems and 'artificial intelligence'. Under this logic, the programme of building an infrastructure of social-emotional measurement is integral to the social-emotional management of the digital economy, by providing evidence of the development of the characteristics, personalities and behaviours required to preserve human capital in an AI-dominated future. As such, emerging SEL policy agendas instantiate a new mode of psycho-economic governance within education, one underpinned by a political rationality in which (ideally) society is measured effectively through scientific fact-finding and subjects are managed affectively through psychological

intervention. Constructing an infrastructure of SEL measurement is central to the enactment of this goal.

Social-emotional learning

'Social-emotional learning' (SEL) interventions, practices and policies are the products of a combination of technologies, measures and practices developed by psychological, behavioural, and economics experts who straddle national borders and public/private sector boundaries. The production of numerical accounts of students' non-cognitive capacities is a core objective of SEL advocates. Referring to 'character education', Bull and Allen (2018: 4-5) describe 'considerable conceptual messiness' across various sites and practices of policy, work, popular culture, schooling, and so on, noting that 'perhaps it is this very messiness and incoherence that enables a productive malleability … to meet a variety of agendas and interests,' whilst adding that the various interest groups all face similar difficulties in producing a 'scientific' evidence base. Similarly, in an extensive scientific review of SEL research and policy, Osher et al (2016: 663) conclude that significant gaps in statistical measurement of SEL 'limit investigators' and policymakers' ability to fully utilize the research findings', and therefore recommend 'the field needs practical measures with psychometric evidence'. To address this gap in the psychometric evidence base, contemporary approaches to SEL therefore centre on the production of novel forms of 'psychodata' about students as statistical insights for policy influence and intervention. The turn to intensive psychometric measurement of social-emotional learning as a means to produce policy-relevant data is the core focus of this article.

Although SEL concepts, such as grit and growth mindset, and their scientific evidence base and ideological underpinnings are widely contested (Duckor 2015; Sisk et al 2018; Effrem & Robbins 2019), they are rapidly expanding across contemporary education policy and practice in the UK, US and elsewhere. In the UK, 'character education' is the subject of political interest under the Conservative government (Burman 2018). SEL programs in the US were boosted by the 2015 Every Student Succeeds Act, notably in a major pilot of social-emotional learning metrics in California, which has identified competencies that are 'meaningful', 'measurable', 'actionable', and can be assessed as a tool of school accountability (Bookman 2015). 'Soft skills' are also integral to the European Union's 'New Skills Agenda for Europe' adopted in 2016.

Internationally, SEL has begun to coalesce as a field of research, practice and policy, as evidenced by the publication of a 600-page *Handbook of Social and*

Emotional Learning in 2016. International organizations including the Organization for Economic Cooperation and Development (OECD), the World Bank, UNESCO, and World Economic Forum (WEF) are extending SEL into global policy spaces alongside think tanks and philanthropic partnerships (Williamson & Piattoeva 2018), while SEL has also become a lucrative international market for commercial providers (Hogan et al 2018) and an investment opportunity for venture capital firms (Belfield et al 2015). The global social media company Facebook has even designed features 'rooted in principles of social and emotional learning' into its controversial Messenger Kids app, in order 'to teach kids how to better understand and express their emotions in creative ways, [and] encourage and promote healthy social behaviors' (Cheng & Govindarajan 2018), while the venture philanthropy NewSchools Venture Fund has assembled 14 SEL scales into new 'mash-up' measurement instruments (Atwood & Childress 2018: 7). As such, SEL has expanded across governmental centres as well as diverse spaces of science, business, investment, philanthropy, technology R&D, and transnational governance organizations, especially as statistical data have begun to emerge.

Like many other domains of contemporary education policy, SEL is the product of shifting, boundary-crossing, and fast-moving networks that encompass governmental centres, commercial companies, think tanks, venture capital firms, philanthropies, and sites of expertise, as well as material objects, flows of money, and reformatory discourses (Ball, Junemann & Santori 2017; Gulson et al 2017; Allen & Bull 2018). As a policy agenda, SEL depends on forms of diffuse, mobile and transnational specialist expertise that are increasingly active in policy processes and international decision-making through the production of 'policy-relevant knowledge' (Littoz-Monnet 2017: 7). Numerical expertise derived from psychological and economics fields is especially privileged as policy-relevant knowledge for shaping SEL policies. This expert knowledge is the product of a topologically-arrayed assemblage of actors, technologies, metrics, and material artefacts that have been arranged in particular ways to produce desired outcomes and effects (Savage 2019). Rather than viewing SEL as a coherent set of policy enactments, then, it is better understood as an emergent arrangement of people, expert knowledge, investments, discourse, technologies and other material things that are all being assembled as an infrastructure to generate policy-relevant data and knowledge.

Disassembling data infrastructures

Infrastructures have become a core concern in education policy research, especially 'data infrastructures' of large-scale testing that enable the collection, connection,

calculation, communication, and consumption of performance data about schools, teachers and students (Gulson & Sellar 2018; Hartong 2018). Apprehending a data infrastructure as a 'sociotechnical assemblage' foregrounds its complex relational composition, not just as a technical system but a concatenation of heterogeneous elements—human, technical, epistemic, political—assembled together to achieve specific aims (Kitchin 2014). As such, data infrastructures consist of computing hardware, software packages, interoperability standards, programmed code and the algorithms employed to perform data analysis, but are also 'embedded in wider sets of beliefs, policies, codes and desires that form part of the infrastructure that gives data the power to reshape life in schools' (Sellar 2017: 342). Educational data infrastructures are thus assembled in spatially and temporally contingent ways, involving diverse human and nonhuman actors, sources of expertise, practical techniques and instruments of assessment, quantification, and standardization, which exert a variety of effects by connecting up governmental centres to sites of practice—although not always seamlessly as infrastructures may only partially connect or relate various organizations, and are mobilized differently in situated practices and settings (Ratner & Gad 2018).

Adopting an 'infrastructural optic' in the study of these complex sociotechnical assemblages foregrounds the power, knowledge and expert assumptions of their producers, the labour required for their functioning, repair, and maintenance, and the ideological work involved in imagining, assembling, and maintaining infrastructures (Plantin & Punathambekar 2018). As a methodological strategy, 'disassembling' a data infrastructure by taking it apart into its component parts offers such an infrastructural optic into the forms of knowledge and expert assumptions of its producers, the discourses and money that promote and enable it, the technicalities, materiality, and labour involved in its production, the political rationalities underpinning it, its interpenetration into other systems and practices, and its relations with the wider political economy (van Dijck 2013).

Looking through an infrastructural optic, the infrastructure of SEL represents an expansion of existing data infrastructures of testing and accountability to data-scientific measurement and assessment of noncognitive skills, but it remains as yet in a state of making as different elements are joined-up. The SEL infrastructure is an exemplar of a 'policy assemblage', characterized by complexity, heterogeneity, mobility, and the arrangement of relations and interactions between myriad moving parts, rather than simple policy implementation (Savage 2019). The central claim of this article is that the transnational mobility of SEL-based policies and practices relies to a significant extent on the sociotechnical infrastructure being

constructed to enable the production and circulation of psychodata. Unpacking how the infrastructure is being assembled requires attention to the specific ways its components have been organized and arranged to derive the data necessary for future policy formation and enactment, and to 'the power relations that make some arrangements possible, and others not' (Savage 2019: 4).

Substantively, the article traces the development of the emerging infrastructure of social-emotional learning and skills, including the OECD's planned Study on Social and Emotional Skills. The analysis concentrates on documents, presentations, interviews, and websites produced by these organizations and associated actors, supplemented with secondary literature, in order to disassemble the wider infrastructure of people, technologies and policies that constitutes SEL measurement. Documents have been gathered through extensive web searches and by 'following' key projects and actors as they have published plans, updates, findings, resources and reports. The analysis focuses mainly on key organizations and projects in the UK and US, where SEL developments are at their most advanced—although there is also significant SEL uptake in Australia, New Zealand, Ireland and Canadian education systems too—and on international organizations that are seeking to embed SEL measurement, policies and interventions across diverse education systems globally. Tracing and disassembling the SEL infrastructure has revealed the arrangement of six key and interacting components: (1) the mobilization of psycho-economic expertise, (2) think tank and philanthropy coalitions, (3) investment mechanisms, (4) commercial platforms, (5) localized policies, and (6) global measurement instruments and technologies. Together, these infrastructural components are making it possible to translate students' psychological attributes into statistics for economic calculation.

Developing an infrastructural optic for the study of SEL, then, the article unpacks how psycho-economic expertise and an assortment of organizations, psychological and economic theories, metric techniques, data collection methods, market demands, and digital technologies, has assembled together to enact the measurement and governance of social and emotional learning. By disassembling the emerging SEL data infrastructure, the article traces an important exemplar of the 'ongoing infrastructuring of educational governance' through database technologies and networks (Ratner & Gad 2018: 5).

The political economy of psycho-economic expertise

Social-emotional learning needs to be understood as part of a political economy in which the measurement of humans' psychological attributes is seen as integral to

economic forecasting and political management of populations (Davies 2018). In this context, the expert knowledge of scientists has become a key source of governance, since by invoking relevant, technical, and 'objective' expertise governments 'can better claim to be unfolding apolitical and neutral policy programs' (Littoz-Monnet 2017: 8). Economists in particular have experienced remarkable success in establishing themselves as experts in local and national governments, international institutions and the media, and are 'involved in some of the most consequential decisions that societies make' (Fourcade 2018: 1). Their expert influence is itself embedded in infrastructures of statistical and calculative practice, built upon the assumption that economic 'knowledge can be attained through measurement and measurement only' (3). As such, 'through ever-finer precision in measurement and mathematics, economists have constructed a wholly separate and artificial reality,' a 'make-believe substitution' through which things in the world are transformed into conventional economics knowledge (3).

Likewise, psychologists have attained a privileged position in policy and governance, with their expert knowledge of human qualities, capacities and behaviours—developed from experimental set-ups, laboratories and field studies—shaping how policymakers understand the individuals and collectives that are the subjects of government (Rose 1999). Psychological and psychometric techniques have therefore been designed and applied to calculate human capacities as numbers (Michell 2008), including the enumeration of the emotions (Dror 2001), and to help manage and 'solve' the problems that psychology has detected in a range of aspects of human feeling and action. A significant part of this enterprise has been the application of psychological theories to economic problems, notably how to systematically inculcate and manage human qualities and capacities that are seen as predictive of future economic outcomes and the generation of productive 'human capital' (Foucault 2008), such as the design of 'correct procedures' for 'maximising the emotional adjustment and the cognitive efficiency of the child' through organizations such as the school (Rose 1999: xxx). As with economics, the infrastructure of psychological measurement—in the shape of psychometric techniques for quantifying personal attributes—has been crucial to the influence, diffusion and uptake of psychology across diverse domains beyond the laboratory (Michell 2017).

As a hybrid of psychology and economics, behavioural economics has become central to how many governments formulate public and social policy (Jones, Pykett & Whitehead 2013). Rejecting standard economic models of behaviour that assume humans act through rational decision-making and self-interest, behavioural

economics has instead focused on the irrational aspects of human behaviour and the inability of people to act in their own long-term best interests (John 2018). Consequently, new kinds of 'behavioural government' have been designed to 'nudge' people to make better choices that might benefit both individuals and the political economy, using 'behavioural, psychological and neurological insights to deliberately shape and govern human conduct' (Whitehead et al 2018: 1). These forms of behavioural government comprehend behaviour as exceeding individual acts of calculated self-interest and strategy, instead involving emotional responses, habits, social norms, and the automatic, unconscious and involuntary aspects of human action, which might nonetheless be predicted, enhanced and exploited (Feitsma 2018a).

The emergence of big data, advanced analytics, and artificial intelligence is now extending capacity for psychological, economic and behavioural governance (Whitehead et al 2018). Algorithmic analyses of huge samples of 'personality' data collected online, for example, are leading psychologists to define novel 'personality clusters' with fine-grained precision (Gerlach et al 2018). Technical affordances to conduct behavioural tracking, 'digital phenotyping' and 'algorithmic psychometrics' have opened up human emotion and behaviour to constant monitoring, quantification, classification, and manipulation (Stark 2018). This includes the use of facial analytics, linguistic sentiment analysis, wearable biometrics, 'emotional AI' and 'empathic media' that are able to make bodies and emotional lives 'machine-readable' as 'intimate data' (McStay 2018). These optical capacities to read the intimate data of bodies are mobilized not just by data companies for commercial advantage, but by government agencies seeking behavioural population insights for purposes of policymaking (Davies 2018). For example, the UK government's Behavioural Insights Team (BIT), or 'Nudge Unit', mobilizes its behavioural economics expertise to undertake data analytics experiments in key public policy areas such as education, and has also started promoting 'nudge theory' to support social-emotional learning in schools (Sanders et al 2017; O'Reilly et al 2017). This application of behavioural policy appeals to a modernist ideal 'to manage society through hard fact-finding' but also to 'a neoliberal agenda, seeking to responsibilize citizens to alter their problematic behaviours rather than change the underlying socio-economic, political, and institutional structures that underpin such behaviours' (Feitsma 2018b, n.p.).

As part of a longer history of scientific influence in policymaking and governance (Webb & Gulson 2014), psychology, behavioural science, and economics now increasingly influence education policy, as 'emerging scientific knowledges and

policy production are "fused" … by means of networked think tank researchers and academic gurus, and highly consumable reports, books, speeches and so on' (McGimpsey, Bradbury & Santori 2016: 2). The noncognitive, socio-emotional aspects of students' learning have become a particular focus in the context of neoliberal, psycho-economic behavioural policy. It is increasingly assumed that many students will not engage sufficiently with academic demands out of rational decision-making about their long-term best interests, but are understood to be behaviourally shaped by emotions, habits and other noncognitive processes (Lavecchia et al 2014). Consequently, the psycho-emotional aspects of education are being targeted by emerging education policies in OECD countries especially (Ecclestone 2017). Psychologists have not only created new knowledge about the non-cognitive substrates of students' academic outcomes and techniques to measure and predict them, but also discovered that they are malleable, improvable and thus amenable to being targeted for improvement through policy programs and pedagogic interventions (Bates 2017). It is in this context that policy interest in social-emotional learning has taken hold, and new sources of expertise have been sought as 'apolitical', 'objective' and 'neutral' justifications for policy ideas and proposals (Williamson & Piattoeva 2019).

Psychological, behavioural and economics experts have been integral to the production of policy-relevant SEL data and knowledge, especially the economist James Heckman and the psychologist Angela Duckworth. Heckman, a University of Chicago Nobel Laureate in economics, has shaped SEL through longstanding research equating investment in childhood development with economic outcomes. He launched the Center for the Economics of Human Development in 2014 to focus on human development and skill formation through interdisciplinary economics, psychology, genetics, epidemiology, and neuroscience (https://cehd.uchicago.edu/). Based on extensive econometric analysis applied to developmental psychology, personality theory and the 'neuroscience of human capability formation,' his 'Heckman Equation' justifies policy intervention in education as a form of 'human capital investment' (https://heckmanequation.org/). Heckman has influentially argued that 'socioemotional skills, physical and mental health, perseverance, attention, motivation, and self-confidence' are all 'important determinants of socioeconomic success, … contribute to performance in society at large and even help determine scores on the tests that are used to monitor cognitive achievement' (Heckman 2008: 3-4). He is densely networked with other SEL actors and organizations, including centres and working groups dedicated to human capital development,

childhood development investment programs, philanthropic funders of SEL initiatives, and high-profile psychologists such as Angela Duckworth.

Duckworth, Senior Scientific Advisor of the Positive Psychology Centre at the University of Pennsylvania, is perhaps the leading SEL psychologist. Awarded a 2013 MacArthur 'Genius' Grant, she is responsible for translating concepts of 'character' and 'grit' into both educational and corporate management practices, notably in her book *Grit: The power of passion and perseverance*, and a TED Talk viewed online nearly 15 million times. Heckman and Duckworth formerly collaborated on research examining the effects of 'personality traits' on socioeconomic outcomes (Borghans, Duckworth, Heckman & ter Weel 2008). More recently, Duckworth and Heckman formed a collaboration to integrate 'social science and genetics, with psychological, economic, and social traits and outcomes', which is exploring innovative 'real-time measurement of cognition, personality and behavior' such as 'affective computing' for emotion detection, 'digital psychometrics' for identifying psychological states, and 'sociogenomic personality assessment' (https://cehd.uchicago.edu/?page_id=265). Supported with US$2.5million by the John Templeton Foundation, Duckworth also established the Character Lab to focus on helping teachers cultivate students' 'character strengths' of grit, curiosity, self-control, gratitude, optimism and growth mindset (https://www.characterlab.org/). It provides classroom resources called 'Playbooks' for teachers and has also established a Character Lab Research Network—a consortium of scientists and 'innovative' schools that works together 'to develop and test activities that encourage the development of character.' She is a key figure in the development of measurement instruments to quantify categories such as grit and character in standard form (Duckworth & Yeager 2015), and as co-director of the Behavior Change for Good Initiative is involved in developing an 'interactive digital platform' to help 'nudge' decisionmaking in health and education (https://bcfg.wharton.upenn.edu/).

As these key experts indicate, SEL is rooted in expertise in psychology and economics, as well as aspects of behavioural economics and advanced technical innovation in measurement, analytics and assessment. These experts are the recipients of prestigious grants and prizes that cut across economics, psychology, behavioural science and education, are associated with major US research-intensive universities, working groups, foundations, nonprofits and spin-out companies, and are using their platforms to become leading advocates and influential thought leaders pushing SEL measurement and analysis in educational policy and practice. Attempts to build a SEL measurement infrastructure depend on the epistemic

foundations laid by these experts in psychology and economics. As well as being psycho-economic experts, Heckman, Duckworth and other SEL authorities embody a political economy in which human psychological qualities are translated into psychometric data as quantitative measures of potential economic value, and behavioural data has become a source for governmental 'nudging' and control.

Think tanks and philanthropic coalitions

Coalitions of think tanks and philanthropic foundations seeking leverage to reform state education have been attracted to the idea that social and emotional learning qualities are malleable and improvable, and therefore key to boosting academic attainment and shaping skills that are seen as valuable to social and economic progress. Crucially, these coalitions act as relays between the domains of expertise and policy by packaging scientific knowledge into accessible evidence digests, standardized frameworks, and glossy reports and websites. As such, they are building on the scientific foundations established by key psycho-economic experts to construct the infrastructural supports necessary for SEL measurement.

CASEL, the Collaborative for Academic, Social, and Emotional Learning, is a significant SEL campaigning organization in the US (https://casel.org/), with a research advisory group that includes Angela Duckworth and private philanthropic funders including The Bill and Melinda Gates Foundation and the Chan-Zuckerberg Initiative (https://casel.org/funders/). Credited with developing one of the most scientifically-informed SEL frameworks (Osher at al 2016), CASEL has a stated mission to integrate 'evidence-based' SEL into state education and 'to turn momentum for SEL into a national movement'. It commissioned two detailed and highly-cited 'meta-analyses' of the research evidence on SEL (Durlak et al 2011; Taylor et al 2017). Drawing on this scientific 'evidence base' to devise its highly influential standardized framework for classifying social-emotional learning, it has also trialled SEL-based school accountability measurements and set up the State Scan Scorecard Project to rate and compare learning goals, standards, and guidelines for SEL across the 50 US states (https://casel.org/state-scan-scorecard-project/). Responding to the SEL measurement gap, CASEL has additionally launched a 'design challenge' for technologies which provide 'innovative direct assessments of social-emotional skills' and guide teachers' 'decisions about curriculum use and instructional practice' (McKown, Read & Bookman 2017), and hosts 'exchange' events where SEL experts and practitioners can 'forge new alliances and gain new insights' into 'evidence-based strategies, practices, and programs' (https://casel.org/wp-content/uploads/2018/12/Final-2019-SEL-Exchange-Call-for-Sessions-Guide.pdf). CASEL's frameworks, metrics and

exchanges have thus become key to building wider coalitions of support for SEL approaches and measures.

Similarly, the Aspen Institute's National Commission on Social, Emotional, and Academic Development (NCSEAD) aims to unite 'leaders to re-envision what constitutes success in our schools' (https://www.aspeninstitute.org/programs/national-commission-on-social-emotional-and-academic-development/). Like CASEL, it receives philanthropic funding from the Gates Foundation and Chan-Zuckerberg Initiative (https://www.aspeninstitute.org/programs/national-commission-on-social-emotional-and-academic-development/funders/). Duckworth is a member of its Council of Distinguished Scientists, while Heckman co-hosted an Aspen event in 2017 on 'The ROI that Matters: Investing in Kids and Families to Build a New Economy'. Both are key citational sources in the influential 'fact sheet' on social-emotional learning circulated by both the NCSEAD and CASEL (https://casel.org/wp-content/uploads/2016/11/SEAD-Fact-Sheet_Final.pdf). Collaborating with CASEL in 2017, the NCSEAD's Council of Distinguished Scientists announced a 'research consensus' drawing from evidence in brain science, medicine, economics, psychology, and education research, which claims to demonstrate that 'the success of young people in school and beyond is inextricably linked to healthy social and emotional development', and that these are 'crucial to preparing the future workforce with the life skills employers increasingly need and value' (Jones & Kahn 2017: 4). On the basis of this 'consensus', the NCSEAD's Policy Subcommittee 'has begun to identify policy opportunities to create the conditions within states, districts, and schools for supporting students' social, emotional, and academic development,' and, informed by developmental psychology and neuroscience, has begun to work on a framework consisting of developmental progressions for SEL across age bands in K-12 education (Aspen Institute 2018: 7). Its final report, entitled 'From a Nation at Risk to a Nation at Hope' (Aspen Institute 2019), was delivered in 2019 alongside a dedicated website featuring video case studies, communication tools, resources, 'creative assets' for practitioners, and detailed 'evidence-based' agendas for research, practice and policy development (http://nationathope.org/).

The John Templeton Foundation has also played a pivotal role in promoting 'character virtue development' in particular, by funding programs both in the US and UK (https://www.templeton.org/). Alongside its philanthropic gifts to character education, Templeton is a US Christian neoconservative philanthropic foundation which 'has ploughed considerable funding into projects aligned with

right-wing agendas', funded free market think tanks and research institutes, and publicly advocated free enterprise, the benefits of capitalism, competition and limited government (Allen & Bull 2018: 442). It has generously donated gifts to the Jubilee Centre, the leading character education research and teaching centre in the UK, and to Angela Duckworth (who has received grants totaling more than $10million according to its grants database). Given its proximity to both Christian right-wing and neoliberal policy interests, the Templeton Foundation aligns SEL with socially conservative and pro-market agendas, suggesting that the ideal or desirable 'character' of its funded programs is a competitive individualist driven to self-improvement through investment in free markets.

These think tanks and their networks are crucial actors in making SEL into a policy-relevant science, in particular by synthesizing psychological and economics expertise and statistical evidence, along with particular political agendas, into standardized formats for propulsion into policy spaces (Williamson & Piattoeva 2019). They are seeking to seize current 'momentum' around SEL to drive policy reform, as the co-chair of the NCSEAD and co-founder of CASEL has claimed:

> 'we need new science, we need new training, we need new standards of implementation, new policies to support [social, emotional, and academic development], new tools to measure its effectiveness. … When you get all those things put together, that's a field. That's a new field with new programs and practices, new policies, and new ways of engaging the community.' (Aspen Institute 2018: 17)

CASEL, the Aspen Institute, and the Templeton Foundation are now leading policy advocates for SEL, with political leverage, influence, and support from other influential think tanks such as the Center for American Progress (Boser & Balfour 2017), the American Enterprise Institute for Public Policy Research and Brookings (AIE/Brookings 2015). In the UK the think tank Demos has also actively supported growth mindset and character approaches (Birdwell, Scott & Reynolds 2015; Reynolds & Birdwell 2015), and the Education Endowment Foundation (EEF) has released the SPECTRUM database (Social, Psychological, Emotional, Concepts of self, and Resilience outcomes: Understanding and Measurement), containing 86 psychometric measurement tools (EEF 2018). These organizations have synthesized expertise about 'what works' in SEL measurement and practice into meta-analyses, consensus statements, policy briefs, diagrammatic frameworks, toolkits and other devices which freeze SEL into standardized and quantifiable form.

In these ways, think tanks and foundations are actively pursuing policy influence through the deployment of policy-relevant science informed by epistemic expertise from psychology, economics and cognate fields, as well as new standards, teacher training, and measurement instruments. While high-profile economists and psychologists such as Heckman and Duckworth, among others, have produced the academic expertise necessary as the scientific evidence base of SEL, these think tank networks, philanthropic foundations and coalitions are seeking to relay this expertise into practical arrangements, standards, measurement tools, and official policy. They exemplify how contemporary policy is increasingly accomplished through advocacy networks and coalitions with the institutional resources to translate the complexities of science into policy knowledge, particularly by packaging the expertise of academic 'gurus' in glossy brochures, websites, fact sheets and graphical framework diagrams (McGimpsey et al 2016).

Investment mechanisms

Specific financial instruments have been developed to support SEL development, as a new kind of investment knowledge has become central to securing philanthropic backing and policy influence. Funding mechanisms are key components in developing SEL measurement systems and practices. In the US, the RAND Corporation and Wallace Foundation have calculated that up to US$16bn of federal funding is available annually under the 2015 Every Student Succeeds Acts (ESSA) to support evidence-based programming to promote SEL (Grant et al 2017), while 'character grants' worth up to £6million were offered in the UK in 2016 (Allen & Bull 2018). Beyond federal funding, Saltman (2017) has described how ESSA—which requires states report at least one 'nonacademic measure' for accountability purposes—has directed investors' attention to SEL programs because it federally supports 'social impact bond' schemes (SIBS). Otherwise known as 'pay for success' programs or 'impact investing', SIBS allow investment banks and wealthy philanthropies to invest in educational services and programs and collect public money with additional interest as profits if they meet agreed outcomes metrics. SIBS have become favoured models for high-impact 'for-profit philanthropy' among SEL-funding organizations such as the Chan-Zuckerberg Initiative (Saltman 2019).

The metrics for calculating the social benefit and monetary value of SEL schemes have already been published as a cost-benefit analysis with the title *The economic value of social and emotional learning*. The report features a simple statistical algorithm for calculating the ROI of SEL programs, which has been used to calculate that SEL programs demonstrate measurable benefits that exceed their costs at an

average benefit-cost ratio of about 11 to 1—a substantial economic return of 11 dollars on every dollar invested in SEL programs (Belfield et al 2015). Itself drawing substantially on the work of Heckman and on evidence collected by CASEL, the report provides a justification for state investment in SEL programs—as long-term returns in terms of earnings and other socio-economic benefits—as well as for investors, who stand to gain substantially by profiting from measurably successful programs. Notably, the SEL cost-benefit report was funded by the NoVo Foundation, a venture philanthropy established to distribute $2billion of the wealth of investor Warren Buffett, which itself invests in social-emotional learning programs in partnership with Rockefeller Philanthropy Advisers, another key impact investing organization (NoVo Foundation 2018). The NoVo Foundation is also a key philanthropic partner of CASEL and a funder of the Aspen Institute (https://novofoundation.org/advancing-social-and-emotional-learning/strategic-approach/). These venture philanthropies have therefore begun to capitalize on the profit available from impact investment in SEL, transforming it from a field of research expertise to a source of valuation and commodification, thereby creating a new affective economy of programs designed to make financial gains from measuring students' social-emotional learning gains.

In this way, SIBS privilege approaches that seek to produce evidence of 'what works', since returns on investment are only offered as repayments and bonuses to funders if the metrics are met or exceeded. SIBS create a market incentive for a bank or investor to fund a social program and generate evidence of 'what works,' with the value of any public spending made measurable through quantitative metrics of social value (Saltman 2019). There is significant financial incentive for venture capital firms, for-profit philanthropies and investment banks to engage with SEL measurement programs as a lucrative route to profit, with the additional 'gift' of power over the allocation of funding and influence in defining social value in public education.

Commercialization platforms

A significant commercial market of SEL resources and technologies has emerged alongside these promises of profitable ROI. The global education business Pearson is a key advocate of SEL. Its collaborative report with the UK government's Behavioural Insights Team extensively references Angela Duckworth to derive practical guidance for schools on grit, growth mindset, and emotional intelligence development (O'Reilly et al 2017). The most prominent commercialization activity around SEL, however, is the creation and sale of educational technologies ('edtech'). SEL is actively promoted by two of the world's most powerful sources

of edtech philanthropy, the Gates Foundation established by Microsoft founder Bill Gates and the Chan-Zuckerberg Initiative set up as a for-profit philanthropy by Facebook founder Mark Zuckerberg (Reilly 2019). Capitalizing on the demand for better instruments to measure and demonstrate gains in SEL, many edtech products combine a focus on non-cognitive development with data-centred tracking and monitoring. At the extreme end, this includes wearable biometric devices for emotion-monitoring. The Mightier Bioresponsive Learning Loop, for example, is a wristband twinned with an app that 'makes emotion visible' as data visualizations and provides biofeedback relaxation games when frustration is detected (https://mightier.com/how-it-works/). The World Economic Forum has promoted wearable biometrics and facial vision applications in its own 'vision' for edtech-enhanced social-emotional learning (WEF 2016).

More common, however, are edtech services allowing teachers to track student behavioural data to indicate their levels and progress in SEL. The classroom monitoring app ClassDojo, which incentivizes growth mindset and character development through the 'datafication of discipline' (Manolev, Sullivan & Slee 2018), is among the most successful with claimed reach to over 3 million teachers and 35 million children worldwide (https://www.classdojo.com/), while HeroK12 provides student behaviour management applications that it claims can support SEL development by monitoring student behaviour data and reinforcing positive behaviours (https://herok12.com/). Both ClassDojo and HeroK12 are the recipients of large venture capital investment as Silicon Valley investors have recognized market growth in SEL products and the substantial ROI available.

Likewise, Panorama Education has developed a 'powerful technology platform' that 'partners with schools, districts, charter networks, and state departments of education to collect and analyze data about social-emotional learning' (https://www.panoramaed.com/). Citing the evidence that investment in SEL provides 11:1 ROI, Panorama markets itself as a set of tools to monitor progress of individual students, whole schools, or even entire districts, and to support each student with 'competencies' that it lists as grit, growth mindset, self-efficacy, social awareness, self-management and emotional regulation. Its student surveys and data analytics tools enable teachers and administrators to track indicators of students' SEL development through data dashboards and automatic 'daily data updates', receive alerts identifying 'early warning signs', and target and track individual and group interventions over time. It also allows educational district leaders to 'track high-level trends across school sites and monitor the progress of key student groups,' and to 'compare each school's progress over time', as SEL is increasingly

treated as a new source of performance comparison and an accountability mechanism.

Panorama also has strong ties to other SEL supporters. It was a winner of CASEL's 2017 design challenge, and raised US$16million in venture capital funding including investment from Mark Zuckerberg's for-profit Chan-Zuckerberg Initiative. It offers online resources created by Angela Duckworth's Character Lab. Notably, Panorama is also building data interoperability infrastructure to enable existing school data on grades, attendance, and behaviour to be combined and cross-analyzed with SEL data. Given its claimed market reach to 7 million students in 8,500 schools across 500 US school districts, Panorama clearly indicates how SEL is becoming a significant site for philanthropic and venture capital investment, technical innovation, psychological intervention, data-driven action, and school and student tracking and comparison at very large scale.

Although SEL policy agendas remain in development, these edtech platforms already shape school priorities and pedagogies to be more SEL-focused, in effect acting as shadow policy technologies mobilized by commercial companies, venture philanthropies and their investors. Edtech platforms, with reach into thousands of schools globally, may even be understood as new producers of policy-relevant knowledge, by generating large-scale SEL data in 'real time' and an extensive evidence base at the kind of scale and speed that bureaucratic international organizations or state departments of education cannot match. They act as practical relays of the commercial aims of SEL edtech providers into the spaces and practices of pedagogy at scales exceeding the national or local boundaries of education systems. In so doing, edtech vendors are becoming policy actors in their own right, by establishing and institutionalizing SEL measurement within schools while seeking to benefit commercially from the investment available for SEL programs that demonstrate measurable evidence of success.

Localizing policy

The uptake of SEL in national policy spaces is contingent on localized political priorities, especially in the US and UK where SEL initiatives and funding mechanisms are at their most advanced. There, national and state-level initiatives have sought to diffuse SEL-based expertise into educational practices at large scale. In 2014 a UK all-party parliamentary committee produced a 'Character and Resilience Manifesto' in partnership with the Centre Forum think tank (Paterson et al 2014), with the Department for Education (DfE) following up with funding for schools to develop character education programs. Informing this program, the

Cabinet Office commissioned a review of the evidence on 'The impact of non-cognitive skills on outcomes for young people' (Gutman & Schoon 2013), and another examining how social and emotional skills measured in childhood are associated with adult outcomes and social mobility (Feinstein 2015). In 2017, the DfE commissioned a survey of character education provision in UK schools, in which it defined character education 'as any activities that aim to develop desirable character traits in children and young people', noting that 'desirable traits' might include, among others: resilience, perseverance and persistence; hard-work, self-control, discipline and good time-keeping; self-confidence, leadership and team-working; honesty, integrity and respect for others; curiosity, problem-solving and motivation (Marshall et al 2017: 10).

Across all these texts is a repeated call for large-scale quantitative measures to assess the efficacy of character interventions. These direct policy-focused reviews have not been taken up or developed coherently by the UK government (Bull & Allen 2018). The official character education program was scrapped by the DfE in 2017 (Burman 2018), only to be resurrected as a 'character and resilience consultation' in 2019. Meanwhile character education advocacy, thought leadership and training persists through the Templeton Foundation-funded Jubilee Centre for Character and Virtues, a research and teaching centre at the University of Birmingham school of education, which seeks to imbed character approaches across the education system (https://www.jubileecentre.ac.uk/). According to Allen and Bull (2018), the Jubilee Centre has received in excess of £16million from Templeton, accounting for 98% of its income, giving it substantial influence and legitimacy to advice on character education policy matters in the UK.

In the US, following the influential US Department of Education 'grit report' (Shechtman et al 2013), SEL was actively supported by the federal Every Student Succeeds Acts of 2015. ESSA mandates that each US state records one 'non-academic' measure of learning, enables states to focus on competency-based and personalized learning, and promotes the role of the educational technology sector in supporting such changes (Curtis 2017). ESSA will distribute funding to districts demonstrating they are supporting 'student growth' in social–emotional learning (Curtis 2017). Influential think tanks offering policy guidance on ESSA have recommended that all US states develop specific social–emotional learning and character development standards and benchmarks to guide pedagogy and improve accountability (AIE/Brookings 2015) and sought support for measurement instruments to make SEL into an accountability mechanism (West 2016). As with

test-based performance ranking and accountability, SEL is being framed as a way of rating educational provision and performance.

UK and US policy trajectories around SEL face in two directions. In the UK, under the banner of 'character', the focus is on politically 'desirable' characteristics in line with the Conservative government's priorities around British values and citizenship (Burman 2018). The US policy context appears more focused on widening its accountability net under ESSA—although prominent SEL experts such as Angela Duckworth have questioned the translation of measures of 'grit' into school accountability programs (Dahl 2016) and the Aspen Institute (2019) has concluded that SEL measures are not yet sufficiently developed for use as school accountability mechanisms. Nonetheless, there is clear discursive symmetry and conceptual malleability between the two policy contexts and the expertise from which they draw, further enabling SEL experts, resource providers, and ed-tech vendors to find purchase in school markets at increasingly international scale.

Clearly, in addition, the ways national systems address and promote SEL relies for its enactment on the subnational enactment in regions, states and schools themselves. Teachers and schools are already enacting SEL through the market of edtech products, consultancy and classroom resources (Hogan et al 2018), ultimately acting to diffuse SEL into practice even where official policy mandates remain inchoate. SEL policy, in other words, is being done not just through international agendas or through national policy, but at subnational, regional, and even institutional levels, assisted by new conduits of influence such as teacher resources markets. In this sense, SEL exemplifies the ways policy operates at multi-scalar levels and is enacted in locally contingent forms.

Globalizing metrics

International organizations such as the OECD, the World Bank, UNESCO and the World Economic Forum are key actors of 'global education policy' and have become active in developing social-emotional learning as a globalizing policy priority (OECD 2015a; WEF 2016; UNESCO 2018; World Bank 2018). The OECD in particular has positioned itself as a source of expertise in the capture and analysis of SEL data, and is developing a global SEL metric for international comparison of noncognitive skills and identification of best practices of 'what works' to measure and foster them (OECD 2015a). As the OECD's Andreas Schleicher (2018: 230) has argued, the OECD is shifting its emphasis from 'literacy and numeracy skills for employment, towards empowering all citizens with the cognitive, social and emotional capabilities and values to contribute to the success

of tomorrow's world'. It is also increasingly emphasizing the new 'sciences of learning' emerging from psychology, neuroscience and biomedical fields (Kuhl 2019). The Study on Social and Emotional Skills (SSES) represents the OECD's expansion from the measurement of 'cognitive skills' (or 'hard skills') through PISA to 'non-cognitive' or 'soft' skills. Through the study, the OECD is seeking to provide a standardized global metric for SEL assessment that can be used to compare progress internationally. As Sellar (2014: 7) notes, the OECD's 'data infrastructure is expanding in scope to enable the classification, measurement and comparison of a broader range of capacities and dispositions as human capital' which includes 'a wider set of "noncognitive skills" that explain differences in earnings beyond what is explainable in terms of cognitive performance, schooling and socio-economic status variables.' As such, SSES needs to be understood as an attempt to expand OECD data infrastructure to SEL, though it is itself nested in the wider psychological, economic and statistical infrastructure of the global SEL movement.

Noncognitive measures have already been designed-in to the OECD's international surveys of early years learning and adult competencies. SSES is presented by OECD as complementary to its existing tests, and it has indicated that substantial future value will come from linking these datasets for longitudinal analysis of correlations between noncognitive skills and cognitive learning and achievement, as well as by potentially linking to local standardized achievement tests (OECD 2015b). A computer-based test planned for initial rollout with ten participating regions in late 2019, SSES will consist of validated international instruments to measure the social and emotional skills of children at ages 10 and 15, and is intended to produce policy-relevant knowledge on the critical role of social and emotional skills and the types of policies and practices that support their development (OECD 2017).

SSES is a key outcome of the OECD's longitudinal Skills for Social Progress program, launched 2013, which has involved significant contributions from James Heckman and his econometric collaborators (OECD 2015a). Drawing on findings previously published in Heckman and Kautz (2013), the OECD paper *Fostering and Measuring Skills: Improving cognitive and non-cognitive skills to promote lifetime success* highlighted that 'IQ tests and achievement tests do not adequately capture non-cognitive skills, personality traits, goals, character, motivations, and preferences that are valued in the labour market, in school, and in many other domains' (Kautz et al 2014: 7). Building on evidence about the return on investment from noncognitive skills interventions, the authors claim 'some have annual rates of

return that are comparable to those from investments in the stock market' (Kautz et al 2014: 8). These justifications for SSES reproduce Heckman's previous econometric finding that 'personality factors are also powerfully predictive of socioeconomic success' (Heckman 2008: 5). As such, SSES has clearly been shaped by the policy-relevance of econometric insights into human capital development, as demonstrated when the OECD awarded the contract the SSES assessment instrument to the Center for Human Resource Research at Ohio State University, which provides 'substantive analyses of economic, social, and psychological aspects of individual labor market behavior to examining the impact of government programs and policies' (https://chrr.osu.edu/).

Although, like most SEL organizations, the OECD presents its focus on social-emotional learning in positive child-centred terms, its methodology for human capital calculation is firmly rooted in the quantitative psychometric tradition of personality measurement. The OECD publication *Personality Matters: Relevance and assessment of personality characteristics* (Kankaraš 2017) is an extensive review of the scientific literature on personality theory and the psychometric measurement of personality factors. It firmly endorses the 'five factor model of personality' consisting of openness, conscientiousness, extroversion, agreeableness and neuroticism (OCEAN) as the framework for OECD measurement of social-emotional skills. The inventor of the Big Five Inventory personality test—Oliver John of the Berkeley University Personality Lab—presented the methodology at a 2015 OECD meeting, where executives and national government representatives agreed to use OCEAN as the basis for SSES (OECD 2015b). Consequently, public documentation of the SSES instrument shows how it will utilize the Big Five model, with questions devised to record information about 19 key skills across the five key categories (plus an additional set of 'compound skills') (OECD 2017). The author of the OECD's *Personality Matters* review noted that 'personality characteristics have a demonstrable relevance for a wide range of policy issues and represent an important, although often neglected, subject of policy interest' (Kankaraš 2017: 4).

Through the combination of econometrics and personality measurement, the SSES survey makes personality characteristics globally commensurable, calculable and comparable as a new source of such policy interest. The OECD has promoted the Big Five as a valid model for international SEL measurement, ultimately positioning personality theory as an objective standard for the psychological classification of students while criticizing the 'moral connotations' of concepts such as 'character' and 'virtue' (Kankaraš 2017: 8). Moreover, it emphasizes the

'policy relevance' of the insight that many personality characteristics are malleable and can therefore become a 'potential target for policy intervention' (82). As its other international tests have evolved in response to changing accounts of human capital which emphasize the 'noncognitive' aspects of valuable skills, 'the OECD's education metrics now seek to quantify not only what people know or can do, but who people are and who they can become' (Sellar & Lingard 2014: 927). That knowledge can then be used for targeted intervention into the malleable aspects of human personality. As such, with SSES the OECD is shifting its ambitions from shaping national-level education systems to intervening in the shaping of children's personalities to achieve economic ends.

Importantly, the OECD has established the test as a way of generating indicators of different nations' preparedness for changing labour markets in an increasingly digital landscape of artificial intelligence, robotization and automation. The concern with adapting education systems to digital innovation underpins both the OECD's Future of Education and Skills 2030 program (https://www.oecd.org/education/2030-project/) and its turn to 'the sciences of learning'—including psychology, neuroscience, biomedicine, and computer sciences—as new sources of policy-relevant insight into 'developing minds in the digital age' (Kuhl et al 2019). As Andreas Schleicher claims in his 'visionary' book on '21st century school systems':

> Perhaps one day machines will be able to do much of the work that is now occupying humans and reduce the demand for many skills at work. … [H]umans are in danger of losing their economic value, as biological and computer engineering make many forms of human activity redundant and decouple intelligence from consciousness. (Schleicher 2018: 230)

As a result, he argues that 'routine cognitive skills, the skills that are easiest to teach and easiest to test, are exactly the skills that are also easiest to digitise, automate and outsource', while 'it is likely that future work will pair computer intelligence with humans' social and emotional skills, attitudes and values' (231-32). Indeed, OECD in-house research concluded that computers outperform human workers on most routine literacy, numeracy and problem-solving tasks (Elliott 2017). This challenge to the 'economic value' of human labour underpins the OECD's shift to new scientific measurements and understandings of noncognitive learning. The OECD's role in shaping policies around 'human capital' development globally is well known, as 'nations now demand data on comparative schooling performance as a surrogate measure of their global economic competitiveness and the OECD has been well positioned to redefine its technical role in education to meet these

demands' (Sellar & Lingard 2014: 931). As Schleicher's comments indicate, the OECD is now turning attention to social-emotional skills as a way of inculcating appropriate emotional skills to 'pair' with computerized artificial intelligence. Likewise, according to a recent World Economic Forum event, artificial intelligence applications are even being trained with 'emotional intelligence' in order to 'match AI and humans emotionally' and further drive productivity in the the so-called 'Fourth Industrial Revolution' (Mantas 2018). These international organizations are seeking 'extensive reform of educational systems to promote twenty-first century learning, with an emphasis on skills that promote economic growth, employment, and innovation' in the 'on-demand' digital economy (Means 2018: 327).

The policy-relevance of SSES, then, is to enable governments to future-proof (or perhaps 'robot-proof') their stock of human capital, first by measuring social-emotional skills through scientific methods, then by calculating these as indicators of socio-economic outcomes, and finally by intervening to ensure humans do not lose economic value as work is increasingly outsourced to digitized, automated machines. While the OECD has long been concerned with measuring human capital, SSES is animated by the need to measure those noncognitive skills that cannot be automated, and to build these economically valuable human capacities to work alongside automated machines. In these ways, it is making the production of 'human-computer capital', where human emotional intelligence is calibrated to the demands of artificial intelligence, into the legitimate target and task of education policy and governance.

Conclusion

This article has developed an 'infrastructural optic' (Plantin & Punathambekar 2018) to examine social-emotional learning as a sociotechnical assemblage of experts, technologies, money, politics, metrics and texts, all being assembled together through significant organizational effort as a 'databased governance infrastructure' (Ratner & Gad 2018). Against the backdrop of rising commercial and political preoccupations with measuring and governing emotions (Davies 2018), a new educational infrastructure is emerging for the objective, standardized tracking and reporting of students' subjective and noncognitive psychological states. The analysis surfaces three key conclusions.

First, complex infrastructures for the production of data and knowledge have become integral to the development of new policy agendas and fields in a context of transnational policy mobility:

> the movement of data and the creation of data infrastructures in education … are central to new modes of governance in education, which in turn demand new modes of educational policy analysis that focus on articulations of the local, national and the global, and, simultaneously, on the related roles of the state, international organizations (e.g. the OECD), edu-businesses and philanthropic foundations. (Gulson et al 2017: 228)

As the analysis has shown, although SEL has a long disciplinary genealogy and uneven policy uptake across different national contexts, a key aspect of the growth of SEL as an emerging priority in recent years is the psychometric 'evidence base' produced by experts and circulated by powerful agencies as a new kind of policy knowledge about noncognitive learning. In its report *The Power of Social and Emotional Skills*, the OECD (2015a: 3) claimed that 'While everyone acknowledges the importance of social and emotional skills, there is insufficient awareness of "what works" to enhance these skills and efforts to measure and foster them.' This situation is changing fast as a large-scale infrastructure for the definition and measurement of SEL has been assembled. Psychological, behavioural and economics experts are generating knowledge and categories to define and measure SEL. Ed-tech platform providers are currently positioning themselves as 'best practice' exemplars of 'what works' in social-emotional learning practice and measurement, supported discursively by large campaigning bodies and financially through venture capitalists and philanthropists seeking substantial return in investment via impact investing schemes. The OECD, meanwhile, is developing assessment instruments to evaluate and compare SEL provision and outcomes across national borders and subnational regions. Beyond being a policy network of interorganizational relations, SEL is constituted by the sociotechnical infrastructure of measurement technologies, people, money, policies, and epistemic expertise which makes the noncognitive aspects of learning possible to define, understand, and act upon in geographically dispersed sites and spaces around the world. Infrastructures are, therefore, sociotechnical instantiations of 'policy assemblages' that consist of human, material, and discursive relations, topological connections and mobilities; close analytical attention to how infrastructures are assembled can help to explain 'how policies move, mutate and manifest … in a context of intense transnational flows of policy ideas and practices' (Savage 2019: 2).

Second, policy is being informed by a new constellation of powerful scientific experts that criss-cross psychological and economics fields and are bringing new statistical knowledge to bear on how education is understood and on how policy is designed. Although psychology and economics have long played a powerful role in policy and governance, SEL represents a novel hybrid of psycho-economic governance that is focused on the development of noncognitive skills in ways

deeply informed by the emphasis on objectively measuring and intervening in (or 'nudging') human emotions and behaviours. Through the advocacy of psycho-economic experts, social-emotional learning has also been 'economized' as a way of producing valuable human capital—individuals who can be nudged to develop the personality traits and socio-emotional skills believed to be predictive of socio-economic outcomes, particularly in the context of rapidly changing labour markets where human emotional intelligence is being reframed as an augmentative capacity to computerized artificial intelligence. As this indicates, policy-relevant knowledge is being produced in new ways, not just as 'depoliticized' statistical evidence, but as the product of the multidisciplinary apparatus of popular psychologists, personality theorists, and econometricians of human capital development. These new nodes of power are integrating into policy networks and infrastructures whereby their expertise is diffusing variously into philanthropic funding, impact investing, think tank advice, edtech platforms, assessment instruments, teaching resources and policy proposals, and interacting at multiple scales of governance, from the international all the way down to the classroom.

Third, and following from this, education policy is gradually adapting to a new political rationality and a political economy in which expert knowledge of human psychology, and behavioural economics especially, is accepted as a legitimate source for policy intervention and governance (Ecclestone 2017). The emerging SEL field is embedded in a political rationality that emphasizes the social, political and economic value to be derived from measurement and prediction of individuals' psychological characteristics, behavioural habits, and personality traits. These forms of psychological and behavioural governance, as embodied in a globalizing behaviour change policy agenda, are dedicated to the intentional shaping of human action, emotions and personal character through the deployment of scientific insights, experimentation and methods (John 2018; Whitehead et al 2018). Feitsma (2018c: 387) terms this a 'psychocracy' or 'technocracy with a psychological twist': a form of public decision-making that 'reduces the world of policymaking to a rational-instrumental and top-down affair dictated by psychological expertise'. The infrastructure of SEL measurement examined in this article is a sociotechnical instantiation of the political rationality of psychocracy within the education sector. New power relations between psychology, economics and governing centres are emerging around the arrangement of SEL infrastructure, in ways that seek to calibrate the affective lives of students to the effective functioning of the future digital economy.

In sum, SEL is the product of a loosely connected network of psychological, behavioural and economics entrepreneurs, global policy advice, media advocacy, philanthropy, think tanks, edtech R&D, investment calculations, and venture capital, embedded in a political economy that prioritizes psychological intervention as a means to economic ends. Together, this loose alliance of actors has produced shared vocabularies, aspirations, and practical techniques of statistical SEL measurement that correlate psychologically-defined categories of character, mindset, grit, and other indicators of social-emotional learning to socio-economic outcomes. The result is ongoing effort to assemble the infrastructural arrangements necessary to generate a statistical psychometric evidence base that might enable SEL to consolidate as an evidence-based policy field. SEL is already becoming a policy priority across OECD nations, but as an emerging policy field it relies on assembling relations between human actors, policies and technologies as a psycho-economic infrastructure for the capturing and processing of quantitative data about social and emotional skills. Although this infrastructure remains incomplete and partially connected, its advocates, producers and expert informants are seeking to sense and quantify students' psychological affects in order to generate productive economic effects.

New forms of data-based governance infrastructures such as that being constructed to generate psychometric SEL data raise significant outstanding methodological and analytical challenges. One is how to capture the mutability, relationality, and multi-scalarity of infrastructures, and what kind of 'inventive methods' may be required to adequately understand 'policy mobility' (Gulson et al 2017). As well as addressing issues of policy mobility, further studies on governance infrastructures need also to engage with the specific technicalities of such assemblages in order to account for the role of computer code, algorithms, data analytics and machine learning in quantifying increasingly 'intimate' aspects of students' learning, affects, and bodies. Moreover, policy analysis needs to renew its focus on the translation of the human sciences into new governance apparatuses, especially as international organizations such as the OECD turn to cognitive, psychological, neurological, and even biomedical sources as the expert knowledge on which to base new measurement technologies and policy advice (Kuhl et al 2019). Alongside the current emphasis on infrastructures for generating 'psychodata', for instance, a range of organizations has begun to develop or promote advanced technologies for the production of neurological 'brain data' or even genetic 'biodata' as objective statistical sources for scientific forms of policy and intervention (Williamson 2018a, b). Studying the new arrangement of the

human sciences with governance infrastructures requires critical policy analysis that can trace the complex ways in which advances in psychology, neuroscience and bioinformatics have merged with infrastructural systems of measurement and intervention to produce new ways of understanding and acting upon the capacities of students. Such developments are reaching beyond the 'statistical stocktaking' of conventional periodic assessment exercises to treat individuals and large populations as 'living bodies that have pulses, flows and patterns' which can be 'sensed' on a continuous basis and then governed through technoscientific interventions (Isin & Ruppert 2019: 222). The infrastructural arrangements of people, technologies, knowledge and expertise that are enabling new psychological, neuroscientific and genetic data to be produced as policy-relevant knowledge in education present an urgent need for analysis.

References

AIE/Brookings. 2015. *Opportunity, Responsibility, and Security: A Consensus Plan for Reducing Poverty and Restoring the American Dream*. The American Enterprise Institute for Public Policy Research and the Brookings Institution. Available at: https://www.brookings.edu/wp-content/uploads/2016/07/Full-Report.pdf

Allen, K. & Bull, A. 2018. Following Policy: A network ethnography of the UK character education policy community. *Sociological Research Online* 23(2): 438-458.

Aspen Institute. 2018. How Learning Happens: Supporting Students' Social, Emotional, and Academic Development. The Aspen Institute National Commission on Social, Emotional and Academic Development: https://assets.aspeninstitute.org/content/uploads/2018/01/2017_Aspen_InterimReport_Update2.pdf

Aspen Institute. 2019. From a Nation at Risk to a Nation at Hope. Recommendations of the National Commission on Social, Emotional and Academic Development. A Nation at Hope website: http://nationathope.org/

Atwood, J. & Childress, S. 2018. Embracing and Measuring an Expanded Definition of Student Success. NewSchools Venture Fund Insight Brief: https://www.newschools.org/wp-content/uploads/2018/08/NSVF_080318_EDSS_Insight_Brief_003-rev.pdf

Ball, S.J., Junemann, C. & Santori, D. 2017. *Edu.net: Globalization and education policy mobility*. London: Routledge.

Bates, A. 2017. The management of 'emotional labour' in the corporate re-imagining of primary education in England. *International Studies in Sociology of Education* 26, no. 1: 66-81.

Belfield, C., Bowden, B., Klapp, A., Levin, H., Shand, R. & Zander, S. 2015. *The economic value of social and emotional learning*. Center for Benefit-Cost Studies in Education, Teachers College, Columbia University.

Birdwell, J., Scott, R. & Reynolds, L. 2015. *Character nation*. London: Demos.

Borhans, L., Duckworth, A., Heckman, J. & ter Weel, B. 2008. The Economics and Psychology of Personality Traits. *The Journal of Human Resources* XLIII, no. 4: 972-1059.

Bookman, N. 2015. Incorporating social-emotional learning into school accountability. EdSource, 18 October: https://edsource.org/2015/incorporating-social-emotional-learning-into-school-accountability-bookman-commentary/88989

Boser, U. & Balfour, P. 2017. Learning Mindsets and Skills: An Opportunity for Growth with the Every Student Succeeds Act. Center for American Progress, 23 June: https://www.americanprogress.org/issues/education-k-12/reports/2017/06/23/434965/learning-mindsets-skills/

Bull, A. & Allen, K. 2018. Introduction: Sociological interrogations of the turn to character. *Sociological Research Online* 23(2): 392-398.

Burman, E. 2018. (Re)sourcing the Character and Resilience Manifesto: suppressions and slippages of (re)presentation and selective affectivities. *Sociological Research Online* 23(2): 416-437.

Cheng, L & Govindarajan, T. 2018. Messenger Kids Introduces New Features and Expands to Canada and Peru. Facebook Newsroom, 22 June: https://newsroom.fb.com/news/2018/06/messenger-kids-introduces-new-features-and-expands-to-canada-and-peru/

Curtis J 2017. We know SEL skills are important, so how the heck do we measure them? *EdSurge*, 9 May. Available at: https://www.edsurge.com/news/2017-05-09-we-know-sel-skills-are-important-so-how-the-heck-do-we-measure-them

Dahl, M. 2016. Don't Believe the Hype About Grit, Pleads the Scientist Behind the Concept. *The Cut*, 9 May: https://www.thecut.com/2016/05/dont-believe-the-hype-about-grit-pleads-the-scientist-behind-the-concept.html

Davies, W. 2018. *Nervous States: How feelings took over the world*. London: Jonathan Cape.

Dror, O.E. 2001. Counting the affects: Discoursing in numbers. *Social Research* 68(2): 357-378.

Duckor, B. 2017. Got grit? Maybe… *Phi Delta Kappan* 98(7): 61-66.

Duckworth, A.L. & Yeager, D.S. 2015. Measurement Matters: Assessing Personal Qualities Other Than Cognitive Ability for Educational Purposes. *Educational Researcher* 44(4): 237-251.

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D. & Schellinger, K. B. 2011. The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. Child Development 82(1): 405–432.

Ecclestone, K. 2017. Behaviour change policy agendas for 'vulnerable' subjectivities: the dangers of therapeutic governance and its new entrepreneurs. *Journal of Education Policy* 32(1): 48-62.

EEF (Education Endowment Foundation). 2018. SPECTRUM database. Education Endowment Foundation: https://educationendowmentfoundation.org.uk/projects-and-evaluation/evaluating-projects/measuring-essential-skills/spectrum-database/

Effrem, K. & Robbins, J. 2019. *Social-Emotional Learning: K–12 Education as New Age Nanny State*. White paper 192, Pioneer Institute.

Elliott, S.W. 2017. *Computers and the Future of Skill Demand, Educational Research and Innovation*. Paris: OECD Publishing.

Feitsma, J.N.P. 2018a. Brokering behaviour change: the work of behavioural insights experts in government. *Policy & Politics*: https://doi.org/10.1332/030557318X15174915040678

Feitsma, J.N.P. 2018b. The Rise of the Nudge Expert. *Discover Society*, 3 April: https://discoversociety.org/2018/04/03/policy-politics-the-rise-of-the-nudge-expert/

Feitsma, J.N.P. 2018c. The behavioural state: critical observations on technocracy and psychocracy. *Policy Sciences* 51: 387-410.

Feinstein, L. 2015. *Social and emotional learning: skills for life and work*. Early Intervention Foundation: http://www.eif.org.uk/publication/social-and-emotional-learning-skills-for-life-and-work/

Foucault, M. 2008. *The Birth of Biopolitics: Lectures at the Collège de France, 1978-1979*. Ed. M. Senellart, trans. G. Burchell. New York: Palgrave Macmillan.

Fourcade, M. 2018. Economics: the view from below. *Swiss Journal of Economics and Statistics* 154(5): https://doi.org/10.1186/s41937-017-0019-2

Gerlach, M., Farb, B., Revelle, W. & Nunes Amarel, L.A. 2018. A robust data-driven approach identifies four personality types across four large datasets. *Nature Human Behaviour*: https://www.nature.com/articles/s41562-018-0419-z

Grant, S., Hamilton, L.S., Wrabel, S.L., et al. 2017. *Social and Emotional Learning Interventions under the Every Student Succeeds Act: Evidence Review*. RAND Corporation/Wallace Foundation: https://www.wallacefoundation.org/knowledge-center/pages/sel-interventions-under-essa-evidence-review.aspx

Gulson, K. & Sellar, S. 2018. Emerging data infrastructures and the new topologies of education policy. *Environment and Planning D: Society and Space*: https://doi.org/10.1177/0263775818813144

Gulson, N., Lewis, S., Lingard, B., Lubienski, C., Takayama, K. & Webb, P. 2017. Policy mobilities and methodology: a proposition for inventive methods in education policy studies. *Critical Studies in Education* 58(2): 224-241.

Gutman, L.M. & Schoon, I. 2013. *The Impact of Non-cognitive Skills on Outcomes for Young People*. London: Institute of Education.

Hartong, S. 2018. Towards a topological re-assemblage of education policy? Observing the implementation of performance data infrastructures and 'centers of calculation' in Germany. *Globalisation, Societies and Education* 16, no.1: 134-150.

Heckman, J.J. 2008. Schools, Skills, and Synapses. IZA Discussion Paper No. 3515: https://heckmanequation.org/assets/2017/01/Schools_Skills_Synapsis.pdf

Heckman, J.J. & Kautz, T. 2013. Fostering and measuring skills: Interventions that improve character and cognition. Technical report, IZA Discussion Paper No. 7750: http://ftp.iza.org/dp7750.pdf

Hogan, A., Enright, E., Stylianou, M. & McCuaig, L. 2018. Nuancing the critique of commercialisation in schools: recognising teacher agency. *Journal of Education Policy* 33(5): 617-631.

Humphrey, N. 2013. *Social and Emotional Learning: a critical appraisal*. London: Sage.

Isin, E. & Ruppert, E. 2019. Data's empire: postcolonial data politics. In Bigo, D., Isin, E. & Ruppert, E. (eds). *Data Politics: Worlds, subjects, rights,* 207-227. London: Routledge.

John, P. 2018. *How far to nudge? Assessing behavioural public policy*. Cheltenham: Edward Elgar.

Jones, S.M. & Kahn, J. 2017. *The Evidence Base for How We Learn: Supporting Students' Social, Emotional, and Academic Development*. The Aspen Institute, 13 September: https://assets.aspeninstitute.org/content/uploads/2017/09/SEAD-Research-Brief-9.12_updated-web.pdf

Jones, R., Pykett, J. & Whitehead, M. 2013. *Changing Behaviours: On the rise of the psychological state*. Cheltenham: Edward Elgar.

Kankaraš, M. 2017. *Personality matters: Relevance and assessment of personality characteristics.* OECD Education Working Papers, No. 157. Paris: OECD Publishing,

Kautz, T., Heckman, J.J., Diris, R., ter Weel, B. & Borghans, L. 2014. *Fostering and Measuring Skills: Improving cognitive and non-cognitive skills to promote lifetime success*. Paris: OECD-CERI. http://www.oecd.org/edu/ceri/Fostering-and-Measuring-Skills-Improving-Cognitive-and-Non-Cognitive-Skills-to-Promote-Lifetime-Success.pdf

Kitchin, R. 2014. *The Data Revolution: Big data, open data, data infrastructures and their consequences*. London: Sage.

Kuhl, P.K., Lim, S.-S., Guerriero, S. & van Damme, D. 2019. *Developing Minds in the Digital Age: Towards a science of learning for 21st century education*. Paris: OECD.

Lavecchia, A.M., Liu, H. & Oreopoulos, P. 2014. *Behavioral Economics of Education: Progress and Possibilities*. National Bureau of Economic Research, Working Paper 20609: http://www.nber.org/papers/w20609.pdf

Littoz-Monnet, A. (ed.) 2017. *The Politics of Expertise in International Organizations: How international bureaucracies produce and mobilize knowledge*. London: Routledge.

Manolev, J., Sullivan, A. & Slee, R. 2018. The datafication of discipline: ClassDojo, surveillance and a performative classroom culture. *Learning, Media & Technology* 44(1): 36-51.

Mantas, J. 2018. Why artificial intelligence is learning emotional intelligence. World Economic Forum, 12 September: https://www.weforum.org/agenda/2018/09/why-artificial-intelligence-is-learning-emotional-intelligence/

Marshall, L., Rooney, K., Dunatchik, A. & Smith, N. 2017. *Developing character skills in schools: Quantitative survey*. London: NatCen Social Research.

McGimpsey, I., Bradbury, A. and Santori, D. 2016. Revisions to rationality: the translation of 'new knowledges' into policy under the coalition government. *British Journal of Sociology of Education*: http://dx.doi.org/10.1080/01425692.2016.1202747

McKown, C., Read, L. & Bookman, N. 2017. *Key Design Principles for Direct Assessments of SEL: Lessons Learned from the First Design Challenge*. CASEL, September: http://measuringsel.casel.org/wp-content/uploads/2017/09/AWG-Design-Challenge-Direct-Assessments-of-SEL.pdf

McStay, A. 2018. *Emotional AI: The rise of empathic media*. London: Sage.

Means, A. 2018. Platform learning and on-demand labor: sociotechnical projections on the future of education and work. Learning, Media & Technology 43(3): 326–338.

Michell, J. 2008. Is Psychometrics Pathological Science? *Measurement* 6(1-2): 7-24.

Michell, J. 2017. On substandard substantive theory and axing axioms of measurement: A response to Humphry. *Theory & Psychology* 27(3): 419-425.

Nemorin, S. 2017. Affective capture in digital school spaces and the modulation of student subjectivities. *Emotion, Society and Space* 24: 11-18.

NoVo Foundation. 2018. NoVo Foundation announces social emotional learning Innovation Fund award winners. Press releases, 12 September: https://novofoundation.org/pressreleases/novo-foundation-announces-social-emotional-learning-innovation-fund-award-winners/

OECD. n.d. OECD Study on Social and Emotional Skills: http://www.oecd.org/education/ceri/OECD-Study-on-Social-and-Emotional-Skills.pdf

OECD. 2015a. *Skills for Social Progress: The Power of Social and Emotional Skills*. Paris: OECD Publishing.

OECD. 2015b. Summary record: Steering Group Meeting of the OECD Longitudinal Study of Skill Dynamics, 17 April 2015: http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/CERI/CD/RD(2015)6&docLanguage=En

OECD. 2017. *Social and Emotional Skills: Well-being, connectedness and success*. Paris: OECD.

O'Reilly, F., Chande, R., Groot, B., Sanders, M. & Soon, Z. 2017. *Behavioural Insights for Education: A practical guide for parents, teachers and school leaders*. London: Pearson.

Osher, D., Kidron, Y., Brackett, M., Dymnicki, A., Jones, S. & Weissberg, R.P. 2016. Advancing the Science and Practice of Social and Emotional Learning: Looking Back and Moving Forward. *Review of Research in Education* 40: 644–681.

Paterson, C., Tyler, C. & Lexmond, J. 2014. *Character and Resilience Manifesto*. The all-party parliamentary group on Social Mobility, with CentreForum & Character Counts.

Plantin, J.-C. & Punathambekar, A. 2018. Digital media infrastructures: pipes, platforms, and politics. *Media, Culture & Society*: https://doi.org/10.1177/0163443718818376

Ratner, H. & Gad, C. 2018. Data warehousing organization: Infrastructural experimentation with educational governance. *Organization* https://doi.org/10.1177/1350508418808233

Reilly, C. 2019. Inside the growing push for social-emotional learning in K-12 education. *Inside Philanthropy*, 21 January: https://www.insidephilanthropy.com/home/2019/1/31/inside-the-growing-push-to-advance-social-and-emotional-learning-in-k-12-education

Reynolds, L. & Birdwell, J. 2015. *Mind over Matter*. London: Demos.

Rose, N. 1999. *Governing the Soul: The shaping of the private self*, 2nd ed. London: Free Association Books.

Saltman, K. 2017. *Scripted Bodies: Corporate power, smart technologies, and the undoing of public education*. London: Routledge.

Saltman, K. 2019. *The Swindle of Innovative Educational Finance*. Minneapolis: University of Minnesota Press.

Sanders, M., Lawrence, J., Gibbons, D. & Calcraft, P. 2017. *Using Data Science in Policy: A report by the Behavioural Insights Team*. London: Behavioural Insights Team.

Savage, G.C. 2019. What is policy assemblage? *Territory, Politics, Governance*: https://doi.org/10.1080/21622671.2018.1559760

Schleicher, A. 2018. *World Class: How to Build a 21st-Century School System*. Paris: OECD.

Sellar, S. 2017. Making network markets in education: the development of data infrastructure in Australian schooling. *Globalisation, Societies and Education* 15(3): 341-351.

Sellar, S. & Lingard, B. 2014. The OECD and the expansion of PISA: new global modes of governance in education. *British Educational Research Journal* 40(6): 917-936.

Shechtman, N., DeBarger, A.H., Dornsife, C., Rosier, S. & Yarnall, L. 2013. *Promoting Grit, Tenacity and Perseverance: Critical factors for success in the 21st century*. U.S. Department of Education, Office of Educational Technology.

Sisk, V.F., Burgoyne, A.P., Sun, J., Butler, J.L. & McNamara, B.N. 2018. To What Extent and Under Which Circumstances Are Growth Mind-Sets Important to Academic Achievement? Two Meta-Analyses. *Psychological Science*: https://doi.org/10.1177/0956797617739704

Soto, C.J. & John, O.P. 2017. The Next Big Five Inventory (BFI-2): Developing and Assessing a Hierarchical Model With 15 Facets to Enhance Bandwidth, Fidelity, and Predictive Power. *Journal of Personality and Social Psychology* 113, no. 1: 117–143.

Stark, L. 2018. Algorithmic psychometrics and the scalable subject. *Social Studies of Science* 48(2): 204-231.

Taylor, R.D., Oberle, E., Durlak, J.A. & Weissberg, R. 2017. Promoting Positive Youth Development Through School-Based Social and Emotional Learning Interventions: A Meta-Analysis of Follow-Up Effects. *Child Development* 88, no. 4: 1156–1171.

UNESCO. 2018. Second Futures Workshop on 'The State of Social and Emotional Learning (SEL) Assessment'. UNESCO: https://mgiep.unesco.org/article/second-futures-workshop-on-the-state-of-social-and-emotional-learning-sel-assessment

van Dijck, J. 2013. *The Culture of Connectivity: A Critical History of Social Media*. Oxford: Oxford University Press.

Webb, P.T. & Gulson, K.N. 2015. Policy scientificity 3.0: theory and policy analysis in-and-for this world and other-worlds. *Critical Studies in Education* 56(1): 161-174.

WEF (World Economic Forum). 2016. New Vision for Education: Fostering Social and Emotional Learning through Technology. http://www3.weforum.org/docs/WEF_New_Vision_for_Education.pdf

West, M.R. 2016. Should noncognitive skills be included in school accountability systems? Preliminary evidence from California's Core districts. Brookings. *Evidence Speaks Reports* 1(13): https://www.brookings.edu/research/should-non-cognitive-skills-be-included-in-school-accountability-systems-preliminary-evidence-from-californias-core-districts/

Whitehead, M., Jones, R., Lilley, R., Pykett, J. & Howell, R. 2018. *Neuroliberalism: Behavioural government in the twenty-first century*. London: Routledge.

Williamson, B. 2018a. Brain data: Scanning, Scraping and Sculpting the Plastic Learning Brain Through Neurotechnology. Postdigital Science & Education 1, no. 1: 1-22.

Williamson, B. 2018b. Postgenomic science, big data, and biosocial education. *on-education: journal for research and debate* 2: https://www.oneducation.net/no-02-september-2018/postgenomic-science/

Williamson, B. & Piattoeva, N. 2018. Objectivity as standardization in data-scientific education policy, technology and governance. *Learning, Media & Technology* 44(1): 64-76.

World Bank. 2018. Step by Step - Toolkit Promoting Social and Emotional Learning (SEL) in Children and Teens. World Bank, 26 June: https://www.worldbank.org/en/topic/education/publication/step-by-step-sel-curricula

View publication stats