

POLICY INSIGHTS
**THE DIGITALISATION
OF EDUCATION**

ABOUT THE PROJECT

NORRAG's work on the digitalisation of education aims to surface fresh analytical perspectives and under-represented expertise about digitalisation and its consequences for education globally. Despite resurgent interest in technology in education research, policy, planning and practice, many areas that are critical to understanding the challenges as well as the benefits of the ongoing digitalisation of education remain understudied, and the evidence that does exist remains under-shared.

This publication developed from an ongoing collaboration with the United Nations Special Rapporteur on the Right to Education that aimed to inform her 2022 report: *The impact of the digitalisation of education on the right to education*. NORRAG convened a nine-month multi-disciplinary expert consultation process that mobilised and distilled learning for education policy and practice from critical and under-represented research and evidence, including from the Global South. This collection shares short pieces authored by participating experts, who provide profound yet digestible insights about the digitalisation of education and its consequences for learners, communities, practitioners and policy makers, and trace future pathways for change and transformation.

More information: www.norrag.org/digitalisation-of-education

ACKNOWLEDGEMENTS

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We are deeply grateful for the time, energy and insight of all of the experts who contributed to the consultation process on the digitalisation of education. Equally, we would like to thank all those who worked on the expert consultation process and the production of this publication. A full list of all those took part is available online [here](#).

In particular, the efforts of Guillaume Dumas, Cristiano Nabuco de Abreu and Serge Tisseron in helping us explore a research gap at the intersection of digital education and health is greatly appreciated.

ABOUT THE AUTHORS

A full list of the 24 experts who contributed to this publication, including their biographies, is included at the end of this publication. This publication is edited and introduced by Anna Numa Hopkins, Policy Engagement Lead at NORRAG, and Moira V. Faul, Executive Director at NORRAG. A foreword to the publication is provided by Koumbou Boly Barry, the United Nations Special Rapporteur on the Right to Education.

ABOUT NORRAG

NORRAG is a global network of more than 5,000 members for international policies and cooperation in education and training. NORRAG is an offshoot of the Research, Review, and Advisory Group (RRAG) established in 1977 and at the time funded by the International Development Research Centre (IDRC) and Swedish International Development Authority (Sida). It was charged with critically reviewing and disseminating education research related to the developing world. The current name was adopted in 1986. Since the move to Switzerland in 1992, NORRAG has been significantly supported by the Swiss Agency for Development and Cooperation (SDC) and the Graduate Institute of International and Development Studies, and more recently, the Open Societies Foundation (OSF).

NORRAG's strength lies in addressing underresearched questions of quality and equity in key issues in education and development, and in amplifying under-represented expertise particularly from the South. NORRAG's core mandate is to produce, disseminate and broker critical knowledge and to build capacity for and with the wide range of stakeholders who constitute our network. Our stakeholders from academia, governments, NGOs, international organizations, foundations and the private sector inform and shape education policies and practice at national and international levels. Through our work, NORRAG contributes to creating the conditions for more participatory, evidence-informed decisions that improve equal access to and quality of education and training.

NORRAG is an associate programme of the Graduate Institute of International and Development Studies, Geneva.

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FOREWORD

Koumbou Boly Barry

United Nations Special Rapporteur on the
Right to Education

For many of us, the past years have brought about substantial changes in the role that technology plays in our lives. The Coronavirus pandemic has made the need to address how digitalisation is transforming education deeply urgent. Digital technologies will have a profound influence on the future of education for individuals, nations and communities around the world. To shape that future, all stakeholders, in particular education policy makers, public decision makers and schools, but also civil society, teachers, students and families, all need to hear fresh perspectives and read responsive evidence from research to support innovative education policy.

It is vital that we explore with open minds the opportunities and the risks that the digitalisation of education may pose for children and youth. Debate is often polarized between optimists and pessimists – however, we need to be aware of both the positive potential of digital tools to make education more accessible and inclusive, and the real possibility of damaging impacts for students and education systems. Critically, we must build and share knowledge about the complex impacts of digitalisation in areas such as inequality, childhood development, and the

quality of teaching and learning, as well as understanding the consequences for public education systems. In particular, we recall the importance of the Abidjan Principles and their role in guiding states and protecting the right to education for all.

As Special Rapporteur on the Right to Education, supported by my team at the Office of the United Nations High Commissioner for Human Rights (OHCHR), I have partnered with NORRAG to explore these issues through a cross-sectoral and multi-disciplinary lens, through a series of six expert meetings. Our aim has been to think outside of the box: to accept and revisit our biases about digitalisation, bring a balance of global expertise to the table, and ask hard questions about what states must do to protect the right to education, as well as human rights within education. This partnership has informed my 2022 report on the digitalisation of education and its impact on the right to education to the Human Rights Council.¹

We are delighted to share this selection of insights from contributing experts in a range of disciplines – from the social and political sciences to digital media, design, neuroscience

and psychiatry. Their contributions are guided by the need to consider how states, public decision-makers and practitioners can navigate the choices we face around digital technology and education, with a focus on how best to protect the right to an inclusive, equitable, safe and quality education for children and young people globally, recognising the needs of their specific contexts.

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Glossary

AI	Artificial intelligence
Big Tech	Big or dominant technology companies
EiE	Education in emergencies
OECD	Organisation for Economic Cooperation and Development
PISA	Programme for International Student Assessment
SDG	Sustainable Development Goal
SDG4	Sustainable Development Goal 4: Quality Education

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INTRODUCTION

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In the phrase “digital education” or “digital learning” in English, the “digital” comes before the “education” or “learner”. The experts who contribute to this collection² counsel against this prioritisation: education and learning are the goal; digital tools may support reaching that goal (more or less; in certain ways and contexts but not others; for certain learners and at certain ages but not others).

While technology and infrastructure always come wrapped in the mantle of progress and modernity, the direction of the progress can – and should – be aimed towards greater human, social and environmental flourishing, with technology put to work to achieve that. Instead, many times we feel what Felicitas Macgilchrist calls the “cruel optimism in EdTech”,³ that is when the object of desire blocks one’s flourishing rather than contributing to it.

The introduction of technology into education has never – alone – solved the problems that education faces; it has added new ones and reconfigured some old ones. There is no doubt that recent processes of digitalisation have transformed education – and will continue to do so – in ways that are evolving, complex, and often seem to outstrip our ability to understand

and analyse them. COVID-19 brought about catastrophic disruptions and new formations in teaching and learning under circumstances of global emergency, which accelerated the pace of this change. The pandemic has also accelerated and entrenched multiple inequities, or “digital divides”, and the processes of marginalisation and exclusion that we have long known permeate the uses of technologies in education.

A review of educational research conducted in 1991 argued that, in schools, “the use of computers has maintained and exaggerated inequities, with poor, minority, and female students having less access”.⁴ A decade earlier, educators at the forefront of innovation were writing of the dual potential offered by new technologies – of creativity, openness and connectedness but also reduced learner agency and increased manipulation. The complexity – and impossibility – of consent in digitalised education makes this dual potential particularly sharp: students whose schools have chosen to use a digital platform that is collecting their data are in no position to give meaningful consent, even if they are of age to. Thus, while many of the central themes addressed in this collection are not new, they are, however,

changing: encoded in more complex ways, and expressed along diverse social, economic, political, cultural and ethical dimensions.

A fairly small body of emerging research has begun to specify and explore the complex ways in which digital actors and processes play expanding roles in education systems and schools, in teaching and learning, in the governance of education, and in the development and implementation of education policies. Digital systems – and the powerful private actors that own them - now play a key role in the management of education, as well as in pedagogy, and the formulation and evaluation of policy.

Despite resurgent interest in technology in education policy, planning and practice, as well as research, many areas that are critical to understanding the digitalisation of education remain under-studied, and the evidence that does exist remains under-shared. In particular, research and policy has often failed to respond to the unevenly distributed impacts of digitalisation, both globally and within nations. While the most marginalised feel the negative impacts of the “digital turn” most keenly, we know the benefits are reaped

by the most privileged. This situation persists as a result of deeply entrenched historic and contemporary inequalities, reflected in research and investment environment that creates knowledge for the powerful, and a policy environment which favours certain kinds of evidence over others. This publication aims to make available and accessible, for education policy makers, practitioners and researchers alike, innovative and under-represented perspectives, and outline why they are valuable.

The authors in this collection provide wide-ranging reflections on digitalisation, alongside carefully formulated insights – from the cutting-edge of research – on what we might learn for better and more equitable education and technology policy and practice. The result of a year-long partnership with the United Nations Special Rapporteur on the Right to Education who is hosted by the Office of the United Nations High Commissioner for Human Rights (OHCHR), the publication addresses six themes from a multi-disciplinary perspective, showcasing short and engaging contributions in

subject-areas from social to medical sciences; from computational psychiatry to political theory.

Beginning with broad questions about the role of technology in education, each theme highlights key issues in how we understand and address the implications of digitalisation for education policy and practice. This includes the relationship between citizenship and digital education; the role of datafication, evaluation and surveillance; marketing practices and the privatisation of education systems; and critical issues at the intersection of diversity, inequalities and digitalisation. The final theme in the volume explores the health impacts of digitalisation for children and young people, where we, along with three experts, identify and outline an urgent research gap at the intersection of health with education and technology. Under each theme we aim to share expertise on risks and challenges, as well as possibilities for trajectories of change oriented towards quality and equity, and opportunities for critical and imaginative intervention.

Our intention is that this publication helps build and share with a broad audience – including those from academia, governments, civil society, international organizations, foundations and businesses – new visions for and pathways towards a more equitable future of digital education. In addition to considering how humans should interact with technology and how to teach them to do this more productively,⁵ more attention needs to be paid to how technology products and industry are structuring human choices and making it harder (not easier) to “click wisely”. In addition to asking what human skills should be developed, we must also ask how could it be otherwise, and work towards that more productive vision.

1

THE ROLE OF TECHNOLOGY IN EDUCATION

There multiple issues at stake in the digitalisation of education, and these are different across face-to-face, distance, and hybrid or blended education modalities. In this theme, authors share ideas on some broad topics that emerge at the intersection of digital technologies and education, including frameworks for understanding the roles that technology can play in teaching and learning, teachers' skills and competencies, strategies for navigating risks and shaping safer educational environments, and the role of education and technologies during crises.

This theme also surfaces some cross-cutting ideas which are explored in more detail in later sections of the collection. Kusha Anand describes how digital agency emerges as central to the experience of both teachers and students in digital and hybrid environments. The capacity of education systems for change and adaptation is examined by Justin Reich in the context of crisis and emergency. Guillaume Dumas identifies key risks to the health and wellbeing of children and young people – and practice approaches to alleviating these are proposed by the European Council for Steiner Waldorf Education and Alison Egan. Collectively, these contributions raise the fundamental issue of the priorities that inform education, the values it imparts, and how we can protect education as a common good.

READING AND RESOURCES

- Kusha Anand recommends the paper *Digital agency in higher education: Transforming teaching and learning* by Toril Aagaard and Andreas Lund.
- Guillaume Dumas recommends the 2011 book *Alone Together: Why We Expect More from Technology and Less from Each Other* by Sherry Turkle.
- Alison Egan recommends exploring the *European Framework for the Digital Competence of Educators [DigCompEdu]*, made available on the EU Science Hub.
- Justin Reich recommends his book *2020 Failure to Disrupt: Why Technology Alone Can't Transform Education*. A "Failure to Disrupt" podcast can also be found online.
- The European Council for Steiner-Waldorf Education recommend watching the Lifelong Learning Week 2021 events on "Development-oriented and age-appropriate media education" and "Towards wellbeing in digital media education", alongside their report on *Competence-based curriculum: Digital Media and Computer Studies for Steiner Waldorf Schools* [available in multiple languages].



CRISIS AND ADAPTATION: SCHOOLING IN THE “FIFTH SEASON”

Justin Reich

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Key takeaways: policy strands to build more resilient education systems

- Strengthen digital infrastructure. Young people and their families need access to communication technologies.
- Develop robust and flexible pedagogies. Schools should develop proficiency with pedagogies that are robust to interruption.
- Strengthen social welfare. Offer robust social welfare systems in normal times that will support young children and their families in times of crisis.

In *The Fifth Season*, the Afro-futurist and speculative fiction writer N.K. Jemisin describes a world transformed by climactic events which end typical seasonal cycles and introduce a “fifth season” of climate emergency – and require the reorganization of society.⁶ The emergency pivot to remote and hybrid schooling that characterized the COVID-19 pandemic may prove a harbinger of a future of interrupted schooling.

Humans are transforming the geochemistry of the Earth. In the climate emergency ahead we will face more fires, floods, freezing events, and disease outbreaks. As these events increase in frequency and severity, schools and other public spaces will close more often. There are at least three policy strands that school systems, municipalities, and states can pursue to build more resilient systems.

Three policy strands to build more resilient education systems.

1. Strengthen digital infrastructure

First, young people and their families need access to communication technologies. In countries with robust technology infrastructures, homes with children should have broadband internet connections and

access to a computing device. Broadband should be treated as a utility, not a luxury good. In places with simpler technology infrastructure, it will be important to ensure that all families have access to the most common mechanisms for remote schooling, whether through SMS-enabled mobile phones, television, or radio. Importantly, schools are unlikely to be the right institutions to ensure technology distribution and maintenance; other municipal and state institutions are likely to be better at IT support, procurement, and supply chain management.

2. Develop robust and flexible pedagogies

There are however, two important roles for schools in building more resilient educational systems. Schools should develop proficiency with pedagogies that are robust to interruption. For instance, competency-based and mastery learning approaches assume variability in the timing of learning and assessment, and offer flexibility in helping students who fall behind to catch up.⁷ Educational researchers should study which approaches are most resilient to interruption and change. Curriculum designers should also consider adjusting standards to address fewer topics in greater depth. When interruptions affect mile-wide,

inch-deep curricula, whole topics are missed. When interruptions affect narrower, deeper curriculum, teachers can adjust nuances of investigation. The best school systems already pursue this more focused approach, and it should be promoted in the face of an uncertain future.⁸

3. Strengthen social welfare

Finally, states need to offer robust social welfare systems in normal times that will support young children and their families in times of crisis. While schools around the world have expanded their workload in remarkable ways to meet the basic welfare needs of children, teaching and learning is a hard enough job and educators should be able to make that important work their sole focus. Other institutions in municipalities and states should ensure that children are fed, housed, and have access to health care and other necessities.

Children are not responsible for the climate transformations happening around them, and they should be protected as much as possible against the deleterious consequences of a generational failure. Prioritising resilience in school systems in the face of the climate emergency is one way to make good on that commitment.



CLOSING THE SKILLS GAP IN SCHOOLS

Kusha Anand

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Key takeaways: what can education stakeholders do to help close the digital skills gap in schools?

- Re-assess and re-design the structure, content, and modalities of education and teacher training to be more agile, open, and inclusive.
- Collaborate and consult with stakeholders to develop effective training and skills support.
- Support teachers' wellbeing and resilience before, during, and after the crisis.

Central to improving the use of digital technology in schools is the efficacy, confidence, and competence of teachers. We have used the term “digital agency” to describe “the individual’s ability to control and adapt to a digital world”. This concept provides a way of understanding the awareness and interplay between teachers and digital technologies.¹⁷

Digital competencies are complex and multi-dimensional – and of course, individual teachers’ confidence and efficacy in digital spaces is highly varied. This variation, and the ability of teachers to exert digital agency, can have diverse impacts on the quality and inclusiveness of education. Listening to teachers’ voices can help us identify loopholes in the online education system, and point us towards new pathways forward.

In order to navigate digital resources and spaces, teachers need efficacy and confidence as well as knowledge and skill. It is this combination that allows teachers to exert agency and navigate digital environments in a meaningful way and use technologies and tools in ways that meet the varied needs of their students. A recent research project conducted in Delhi, India showed that when teachers lack the efficacy and confidence to teach digitally, without for

example chalk or experiments in the laboratory, they can fall back on teaching methods such as rote-memorising, rather than focusing on child-centred approaches, which support conceptual understanding and critical thinking.¹⁸

Too often, teachers are working online without enough training and support. This can limit their ability to meet the needs of students – with implications for the inclusiveness of education around the world. Globally, education technology (EdTech) companies have stepped in to fill this pedagogical vacuum. However, there is little evidence that EdTech solutions for hard-to-reach children are successful in helping teachers and schools serve these communities.¹⁹

At the same time, new pressures on teachers have resulted from online classes affording parents and school management new opportunities to monitor teaching in often unfamiliar digital environments, and during times of crisis. In the same study in India, many teachers reported discomfort, awkwardness and low levels of personal capacity when teaching online.

What can education stakeholders do to help close the digital skills gap in schools?

- There is a need to re-assess and re-design the structure, content, and modalities of education and teacher training to be more agile, open, and inclusive. Teachers need training on the method and practice of teaching inclusively when using digital tools and resources.
- To find solutions that work for communities, education and training institutions need to collaborate and consult with stakeholders (including parents, headteachers, teachers, NGOs, and other agencies) to develop effective training and skills support.
- Education stakeholders must consider and protect the well-being of teachers when planning distance learning. Education institutions should aim to support teachers’ wellbeing and resilience before, during, and after the crisis.

NAVIGATING RISKS FOR CHILDREN AND YOUNG PEOPLE

Guillaume Dumas

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Key takeaways: navigating risks to the development of children and young people

- There are three kinds of risk to consider: to children and young people's brain development, agency, and diversity.
- Navigating these requires taking a developmental approach, sensitive to children's needs at different stages of life.
- As both complexity and the potential for lasting impacts are high, a cautious approach is sorely needed. By trialling technologies at small-scale, and conducting rigorous evaluations before large-scale adoption, policy makers can aim to develop strategies that respect the agency and diversity of children and young people, as well as support their learning.

From the perspective of the brain sciences, the risks posed by the use of technology in education are complex and multifaceted. Although we have much still to learn, research has established the existence of clear risks, which indicate the need for caution when shaping the role that technology plays in education.

We can think of these risks as falling into three categories. First are risks to the social and cognitive development of children and young people. This is linked to the second type of risk, which is to the agency of students: the risk that their agency might be manipulated or displaced by digital technology. Finally, some risks relate to the capacity of technology to account for diversity, in both a social and an individual sense, as well as at the level of neurodiversity.

Responses to each type of risk should be considered developmentally: the needs of very young children will be different from those of young adults. Taking the first type of risk, research tells us that we must prioritize face-to-face interaction over online, certainly for children under 6 years old whose brains are developing rapidly in response to the external world. The social brain develops through non-

verbal, spontaneous interaction with other humans. Limiting the face-to-face interaction of young children is likely to have real and lasting neurological impacts, shaping social skills.

In relation to the second category of risk, it is critical that in education settings (as elsewhere), we respect – and resist the manipulation of – student agency and choices. An example of this factor at play is in the influence of marketing through educational platforms – for example, through algorithmic manipulation. Adolescents, whose capacity for social cognition and self-awareness are still undergoing deep changes, are vulnerable to how marketing might play with group affiliation biases, especially with messages about who is “in” or “out” of a given social group.

Finally, all young minds are different. Where digital technology is used in education, it must be able to account for and respond to this diversity. This is a real challenge for digital solutions, where barriers to access, barriers to use, and failure to support learning through interaction with an educator can all increase the risk that technology will fail to respond to the needs of any individual child. One strategy put forward to counter this is Universal Design.

Universal Design draws on learning from cognitive neuroscience and elsewhere to guide the development of flexible and inclusive tech and learning environments.



Figure 1
Designing for accessibility: designing for users on the autistic spectrum



Source: UK Home Office. Available at: <https://ukhomeoffice.github.io/accessibility-posters/posters/accessibility-posters.pdf>. Licenced under Creative Commons (CC).

PEDAGOGY LEADS THE LESSON

Alison Egan

Director of IT & eLearning at Marino Institute of Education, Ireland

Key takeaways on the value of a “pedagogy first” approach

- A “pedagogy first” approach aims to ensure that learning needs and objectives continue to “lead the lesson”.
- This shifts our focus away from *whether or not* to use technology, and towards *how* we use it to enhance teaching and learning.
- New practice frameworks propose new pedagogies and support educators to integrate technology into education environments in a manner that serves learning objectives and helps them retain pedagogical control.

A “pedagogy first” approach to the use of technology in education aims to ensure that learning objectives remain the central focus of the lesson. It also helps to structure appropriate choices about which digital tools are useful, when and why. Here, I outline the problem faced by educators when they are asked to integrate technology into the classroom. In doing so, I demonstrate the benefits of a “pedagogy first” approach for students, teachers and the wider education community.

During the Coronavirus pandemic, especially in the first few months of lockdown, many school children could not access lessons if they did not have a device or broadband connection at home. Where devices and technological tools were purchased and issues of connectivity solved, the content of the lesson came into focus. At first, many in the education community grappled with the question of how technology could replicate a face-to-face classroom environment in a pedagogically effective manner. Over time, some students began to criticize an over-reliance on tools such as Zoom. Teachers were “digitizing the status quo”, rather than using technology to enhance their online classrooms.⁹ “Zoom fatigue”

emerged, and teachers and students began to wonder “what else” they could do online.

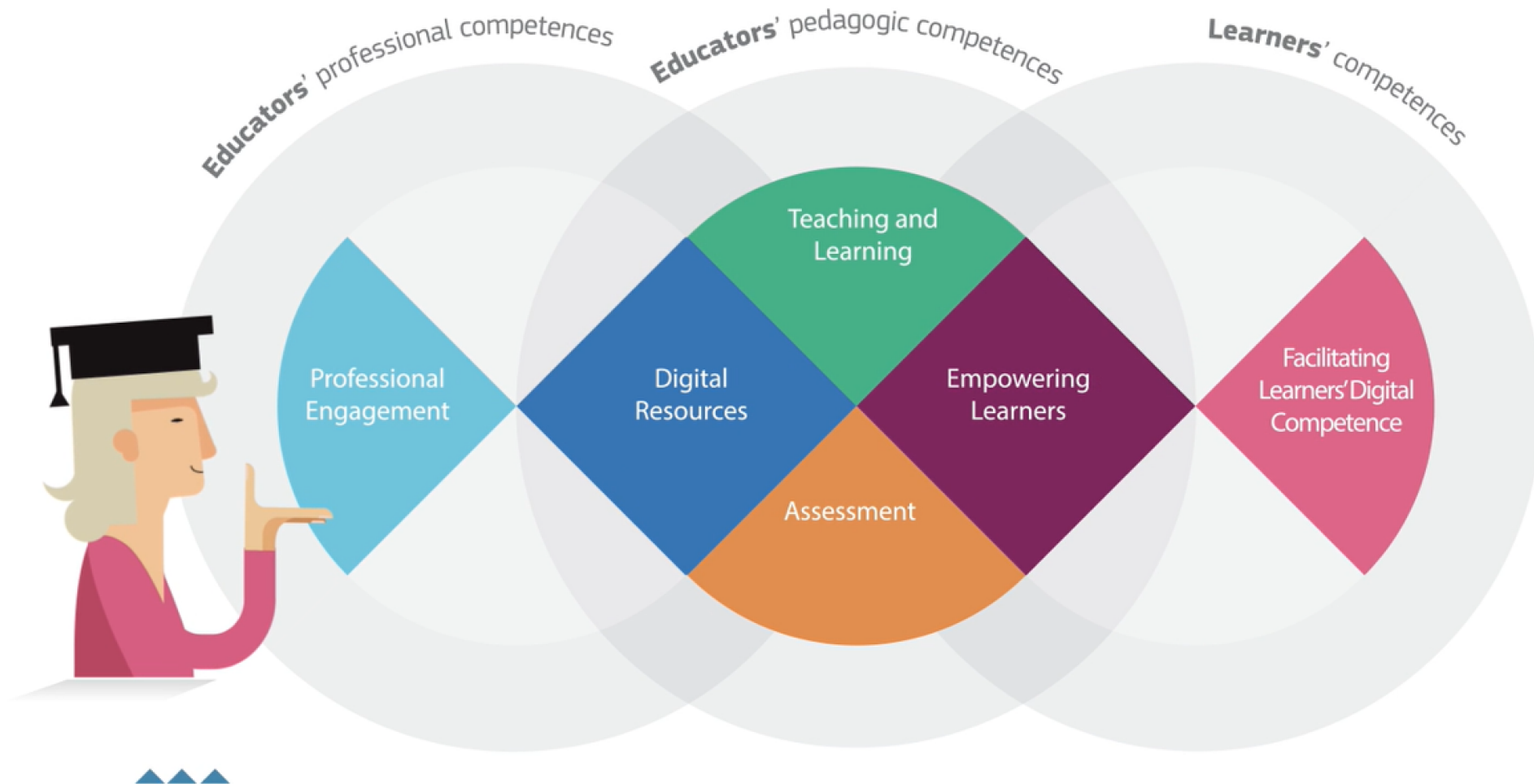
For educators, incorporating technology into lessons and classrooms poses pedagogical challenges. How and when should different technologies be used in order to enhance learning? Recent literature and practice frameworks have explored how new pedagogies are needed to support the use of digital technologies in education environments. Several of these models demonstrate a “pedagogy first” approach – for example the TPACK (technology, pedagogy and content knowledge) model, which proposes different levels of technology integration.¹⁰ These models support educators to make choices, led by learning objectives, about how technology can best support their aims. This is crucial so that educators (and not technologies) retain pedagogical control, a continuing concern for educationalists in this new digital environment.¹¹ “Pedagogy first” doesn’t mean ignoring choices around technology – as scholar and educator Punya Mishra puts it, it means considering “the *what* to the *why* in educational technology”.¹²

Integrating technology into education environments also requires new skills and competencies, as Dr. Kusha Anand explores in her contribution to this collection. This focus on a varied set of skills is reflected in the European DigCompEdu framework,¹³ which outlines a range of professional and pedagogic competencies, as well as technology-specific skills. This framework is based on a long consultative process with educational stakeholders in Europe and combines many of the previous models into a cohesive, practical, easy to follow model for educators and learners alike.

One of the key learnings from the recent online pivot is the acknowledgement by many that technology cannot replace the classroom environment. Increasingly, educators understand the pitfalls of a perspective that views technology as the impetus for change, rather than as a facilitator. This is perhaps best expressed by Seymour Papert who said, in a 1987 article on IT and education, “it is not drill and practice, or Logo, that will achieve this or that result; it is *how* we use things”.¹⁴



Figure 2
Educators' and learners' competencies in the DigCompEdu Framework



Source: Publications Office of the European Union. Available at: https://joint-research-centre.ec.europa.eu/digcompedu_en. Licenced under Creative Copyright (CC).

SHAPING INTERACTION WITH TECHNOLOGIES: MEDIA MATURITY AND DIGITAL BALANCE LITERACY

European Council for Steiner-Waldorf Education

Key takeaways: shaping interaction with digital technologies in educations settings

- Age-appropriate and development oriented digital media education can help prevent problematic screen media use and digital addictions, and should thus be strongly encouraged.¹⁶
- Media maturity is a prerequisite for sovereign, skilful and healthy independent use of digital media.
- Digital balance literacy entails the ability to make informed judgements between healthy and harmful uses of digital media and should thus be strongly considered when aiming for high-quality education on digital technology use.

According to the *EU's DigComp 2.2: Digital Competence Framework for Citizens*, protecting health and well-being in digital education is the ability to “avoid health-risks and threats to physical and psychological well-being while using digital technologies.”¹⁵ This is illustrated with examples such as: being “aware of the importance of balancing the use of digital technologies with non-use as an option”, knowing “signs of digital addictions” and knowing “how to apply, for oneself and others, a variety of digital usage monitoring and limitation strategies.” Furthermore, a digitally competent citizen is “inclined to focus on physical and mental wellbeing and avoid[s] the negative impacts of digital media”. All of these are skills that require a well-developed person, capable of self-reflection and self-regulation.

Provided here are a few lessons for how we as educators can shape children and young people's interaction with digital technologies, to support such skills by developing “media maturity” and “digital balance literacy”.

Media maturity is a prerequisite for the development of digital competence

Healthy physical, emotional, social and mental development is a prerequisite for the skilful, independent and sovereign use of digital technology. “Media maturity”, described by prof. Bleckmann, is one's ability to decide how much time to spend on digital tools, for which purpose and always with a conscious and critical approach. And thus age-appropriate and development-oriented media education only introduces digital technology in classrooms after children demonstrate a significant degree of media maturity and the adequate level of media literacy. In Figure 3 below, we provide an overview of indirect and direct media literacy education that aims to gradually build media maturity.

Early and problematic use of digital media hampers children's healthy development

Problematic screen media use harms various strands of children's development. Even when immediate effects are not visible, long-term

effects include obesity, sleep problems/ disorders, delays in motoric, language and cognitive development, attentional problems, loss of empathy, and other mental and physical health problems (see for example the contributions by Guillaume Dumas and Cristiano Nabuco de Abreu in this volume). Forms of digital addiction include Internet gaming disorder (IGD), Internet addiction, compulsive computer use, and Problematic Internet Use (PIU). Supporting media maturity and an understanding of digital balance are key in preventing problematic screen media use.

Children need support in developing healthy digital balance literacy

Digital technologies use a variety of persuasive and motivational techniques designed to keep users returning, and children and youth are easy targets. These techniques increase the risk of addiction and overuse. So, it is crucial to acknowledge them in order to intentionally either avoid or build resistance to them. Healthy “digital balance literacy” refers to the ability to set clear lines for oneself and for others on exposure to digital technologies, to preserve



one's health and well-being. When it comes to children and young people, it is up to their parents and teachers to detect and draw those lines using a variety of monitoring and limitation strategies, until they are mature enough to draw them themselves.

Figure 3
Media education in Steiner Waldorf education

– 6 years | 1st seven years

**Encounter the real world
through embodied experience**

Indirect media education

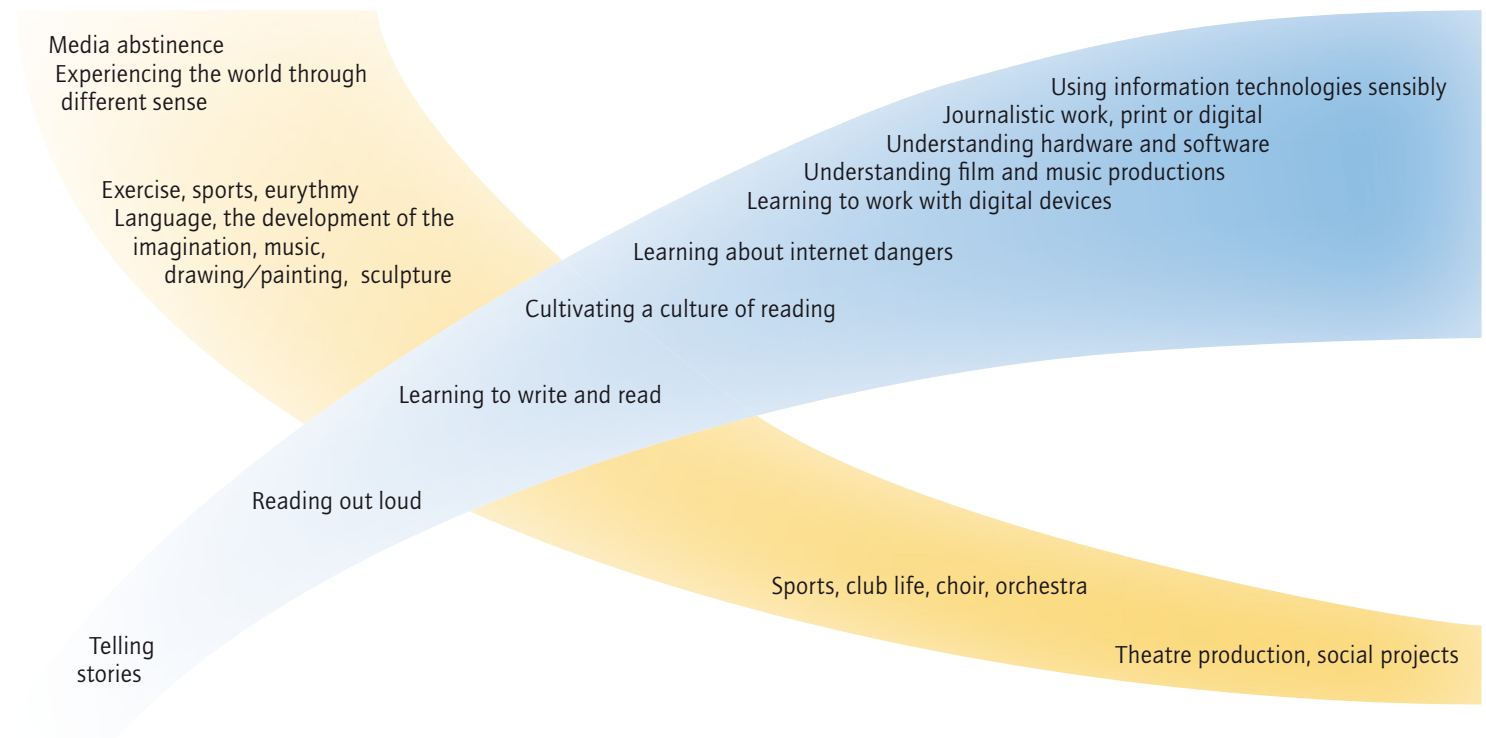
7 – 12 years | 2nd seven years

**Practice
analogue techniques**

13 – 18 years | 3rd seven years

**Understand and master
digital technology**

Direct media education



Source: ECSWE (2021). Available at: <https://ecswe.eu/wp-content/uploads/2021/09/Media-Education-in-Steiner-Waldorf-School-s-2021.pdf>.

2

DATA, DATAFICATION AND SURVEILLANCE

The issues of datafication and surveillance pose formidable challenges for education decision makers – they are complex, technical, and often opaque. This theme draws on the expertise of specialists in education and technology, global education governance, sociology and mathematics, to draw out key priorities in a thorny area.

First, Paul-Oliver Dehaye and Jessica Pidoux identify the value and drawbacks of data power for different stakeholders in education, including students, teachers, administrators, employers and tech companies, highlighting how this complexifies accounts of the value of data for educational decision making. Neil Selwyn outlines critical concerns about data and digital education, describing different forms of data, the challenges involved in use

them for educational benefit, and priorities for future education policy. Priscila Gonsales shares the work of the Brazilian Open Education Initiative Educação Vigiada [Surveillance Education] – and discusses possibilities for Open Education and Open Education policy. Sotiria Grek explores the role that metrics have come to play in education governance – and in shaping policy agendas.

The contributions touch also on issues explored in more detail in Theme 3 on privatisation. Central to this debate are questions about the responsibilities of states and policy makers in education systems that are increasingly structured by multiple actors and competing priorities.

READING AND RESOURCES

- Paul-Oliver Dehaye and Jessica Pidoux suggest exploring the #Digipower Investigation, which looks at how decision-makers can be influenced with the data collected about them. Key readings include the *Auditing the Data Economy through Personal Data Access* by Alex Bower and colleagues and *Understanding Influence and Power in the Data Economy* by Jessica Pidoux et al. Finally, they both recommend Cathy O'Neil's 2017 book, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*.
- Priscila Gonsales recommends Educadigital's Open Education Policy Game, available in English, Spanish and Portuguese.
- For an overview, Sotiria Grek shares her work with colleagues Christian Maroy and Toni Verger, the *World Yearbook of Education 2021: Accountability and Datafication in Education*.
- Neil Selwyn recommends his 2015 paper *Data entry: towards the critical study of digital data and education*, published in the journal *Learning, Media and Technology*.



THE VALUE AND DRAWBACKS OF DATA POWER IN EDUCATION

Paul-Olivier Dehaye

CEO of Hestia.ai and founder of PersonalData.IO

Jessica Pidoux

Post-doctoral Researcher in Sociology at Centre for European Studies and Comparative Politics (CEE), Sciences Po Paris, France, and director of PersonalData.IO

Key takeaways: what should decision makers have in mind as they navigate the value and the drawbacks of data in education?

- Data systems are structured by power and competition, and introduce complex incentives in to education systems. Who owns data, and who has access to it, are critical questions.
- Among data intermediaries, companies structuring the interfaces used directly by students are the ones that hold the strongest position to influence market forces and steer the evolution of the rest of the ecosystem.

The presumed value of data power to students is that more quality data can help identify opportunities for pedagogical improvement. In theory, data can increase the accountability of institutions to policy makers and increase transparency in their investments. These student benefits really come at the end of a long road, along which multiple stakeholders' interests compete and dominate.

For a teacher, data can be valuable to assess more quickly how students are progressing. In online courses, much more granular data is available, such as on the time and duration of homework completion. The mere awareness of this additional data collection could feel stressful and invasive for students, affecting the quality of their work even before any of the potential of this data is realised.

Many educational researchers are interested in observing in a more incremental and detailed way how students interact with material. Their hope is that new insights can be gained about how students learn, and that this might assist in formulating new educational methods.

Educational administrators within institutional settings also have an interest in data. Under "data-driven decision-making", the assessment

of students' and teachers' performance can steer the allocation of resources.

For employers too, data offers the possibility of standardizing and automating the whole hiring process, potentially introducing new algorithmic discrimination biases.

Digital platforms are becoming the new intermediaries of traditional educational processes. As data accelerates and amplifies possible outcomes, the power dynamics between stakeholders change. They tend towards greater concentration: from students to educators, from educators to researchers and administrators, and eventually to policy makers. However it is platforms that become the arbiters of power.

In continuous or lifelong education settings, the training of people and the training of algorithms come together. That is, employees can also be used to train machines with new skills. For instance, Google has used its online programming courses to build an artificial intelligence (AI) programming assistant, suggesting code changes to correct mistakes – a first step towards replacing those newly skilled employees with machines.

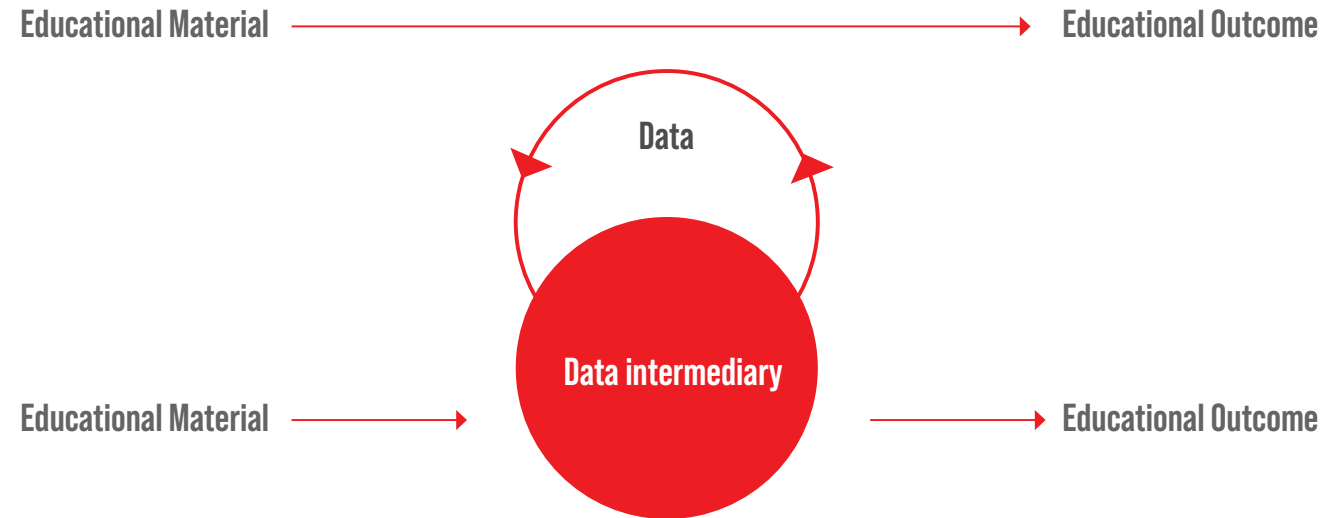
What should decision makers have in mind as they navigate the value and the drawbacks of data in education?

In current data systems, value creation focuses on the idea that more data leads to better inferences about educational users' activities, and then to general improvement of the educational system at large.

However, the situation is far more complex.

- Data systems are structured by power and competition, and introduce complex incentives in to education systems. Those delivering educational experiences act as arbiters between different beneficiaries (employers, universities, etc) and orchestrate internal competition amongst peers, for obtaining more knowledge / information and therefore power over others. Who owns data, and who has access to it, are critical questions.
- Among data intermediaries, companies structuring the interfaces used directly by students are the ones that hold the strongest position to influence market forces and steer the evolution of the rest of the ecosystem.

Figure 4
The role of the data intermediary



Source: Dehaye (2021).

DATA AND DIGITAL EDUCATION: CRITICAL CONCERNS

Neil Selwyn

Distinguished Professor in the Faculty of Education, Monash University, Australia

Key takeaways: priorities for future education policy making

- The provision of “critical data literacy” components in school curricula and teacher education programs.
- The development of nationally enforced standards for educational data interoperability.
- National oversight over how digital technologies are implemented.
- The development of non-proprietary data tools, services and platforms.
- The establishment of national data commons and open data repositories.

Data is implicated in all aspects of digital education, with the increased use of digital technologies in education resulting in the increased production of data. This has led to a number of distinct ways in which data and digital education are coming together.

- In the generation and circulation of **system-level standardised measures** and metrics, such as PISA (the OECD’s Programme for International Student Assessment), NAPLAN (Australia’s National Assessment Program – Literacy and Numeracy) and other standardised assessments) through digital technologies.
- In **“learning analytics”** and educational data-mining products using large-scale data generated from classroom technologies to infer insights about learning and teaching which are fed-back to students, teachers and administrators.
- Through **teachers using technologies** to generate small-scale data within classrooms to inform evidence-based practice and “data-driven decision making”.

- In digital **“trace data”** generated from devices and software used in classrooms being routinely extracted and sold to commercial data brokers and third parties involved in the “data economy”.

A number of concerns are emerging around how these issues are playing out in practice across classrooms, schools and education systems.

The under-use of digital data

While digital technologies are now generating large amounts of data about students and their learning activities, it seems that the vast majority of this data is currently under-utilised in schools. At present, much of the digital data generated by school systems and classroom software remains accessible only to platform providers – with schools often unaware of how this data is being used by third parties. Even when data is accessible, its usefulness is often limited by technical issues of interoperability. Moreover, in most schools, data is being used by small groups of staff with prior data skills and experience. All told, data use is not a widespread part of everyday education practice.

The limited representativeness of digital data

While useful, the data that can be generated through digital technologies about students, teaching and learning, remains limited in its scope and representativeness.²⁰ While analytics products increasingly promise to measure a range of educational outcomes, many important aspects of education remain unquantifiable. The increased provenance being paid to data within schools raises risks of reductionism, and the marginalisation of aspects of schooling and student characteristics that are not easily quantifiable.

The rise of dataveillance and deskilling

Continuous data-based monitoring and tracking of students and teachers lends itself to what can be termed “surveillance pedagogy”. This is leading to concerns over the crude managerial uses of classroom data to judge teacher performance, as well as the ways in which dataveillance can disproportionately impact already marginalised groups of students.²¹ There are also concerns over teachers’ capacity to explain and/or be held accountable for data-based decisions arising from classroom technologies.

Data and digital education: priorities for future education policy making

- The provision of “critical data literacy” components in school curricula and teacher education programs.
 - The development of nationally enforced standards for educational data interoperability – that is, measures that allow the easy exchange and reuse of educational data between different systems and organisations.
 - National oversight over how digital technologies are implemented in schools, in terms of ensuring compliance with relevant data regulations.
 - The development of non-proprietary data tools, services and platforms that are based around values of openness, transparency and common stewardship (rather than individual ownership) of data. (See the contribution by Priscila Gonsales).
 - The establishment of national data commons and open data repositories to allow for collaborative use of data generated within school systems (see, for example, Finland’s national Avoim Data portal,²² or the NYC Open Data initiative²³).
-

OPENING UP DIGITAL TECH FOR EDUCATION

Priscila Gonsales

Founder & Director, Educadigital Institute, Brazil

Key takeaways: three ways to support open digital education

- Make open software frameworks more widely available, and provide training and communities of practice for educators to engage with and learn about them.
- Create consortiums between universities and schools to provide collective technical infrastructure.
- Establish partnerships with local private organisations who offer open software services and privacy policies that address education as a right.

The implementation of Open Education (OE) and Open Educational Resources (OER) policies has grown worldwide, based on the conviction that resources financed by public funds must be open and accessible to everyone. OE is an educational movement and philosophy founded in openness, participation and inclusion. OE argues that education is built on sharing knowledge, and aims to eliminate barriers to high-quality educational experiences and resources.²⁴ In Brazil, a federal policy launched in 2018 determined that any educational resource commissioned or paid for by the Ministry of Education and used in basic education should be available for anyone to “access, use, adapt and distribute at no cost”.

Open Education policies can also serve to promote digital rights. During the COVID-19 pandemic, universities and schools suspended classes and adopted commercial platforms as a way to maintain educational activities, often without considering the embedded risks involved. A large number of Big Tech companies provided “free” services to encourage the use of their networks and products. While such partnerships avoid the expenditure of financial resources by public administrations, there is

hidden value extracted by tech corporations from our data and metadata.

The Brazilian Open Education Initiative – Educação Viglada [Surveillance Education] – was launched in 2020 to investigate the hidden costs built into these so-called “freeware” or cost-free services. Our mapping reveals that 65% of public universities and state departments of education are exposed to what Shoshana Zuboff has termed “surveillance capitalism”.²⁵ This describes the business model used by Big Tech corporations, which is based on the extensive extraction of personal data and the use of algorithms. By exploiting the resulting user behaviour predictions, these companies make their products and services more attractive and marketable, and thus become more successful in the “attention economy”.²⁶ However, there is very little transparency about these processes in the terms accepted by public entities regarding “free” services.

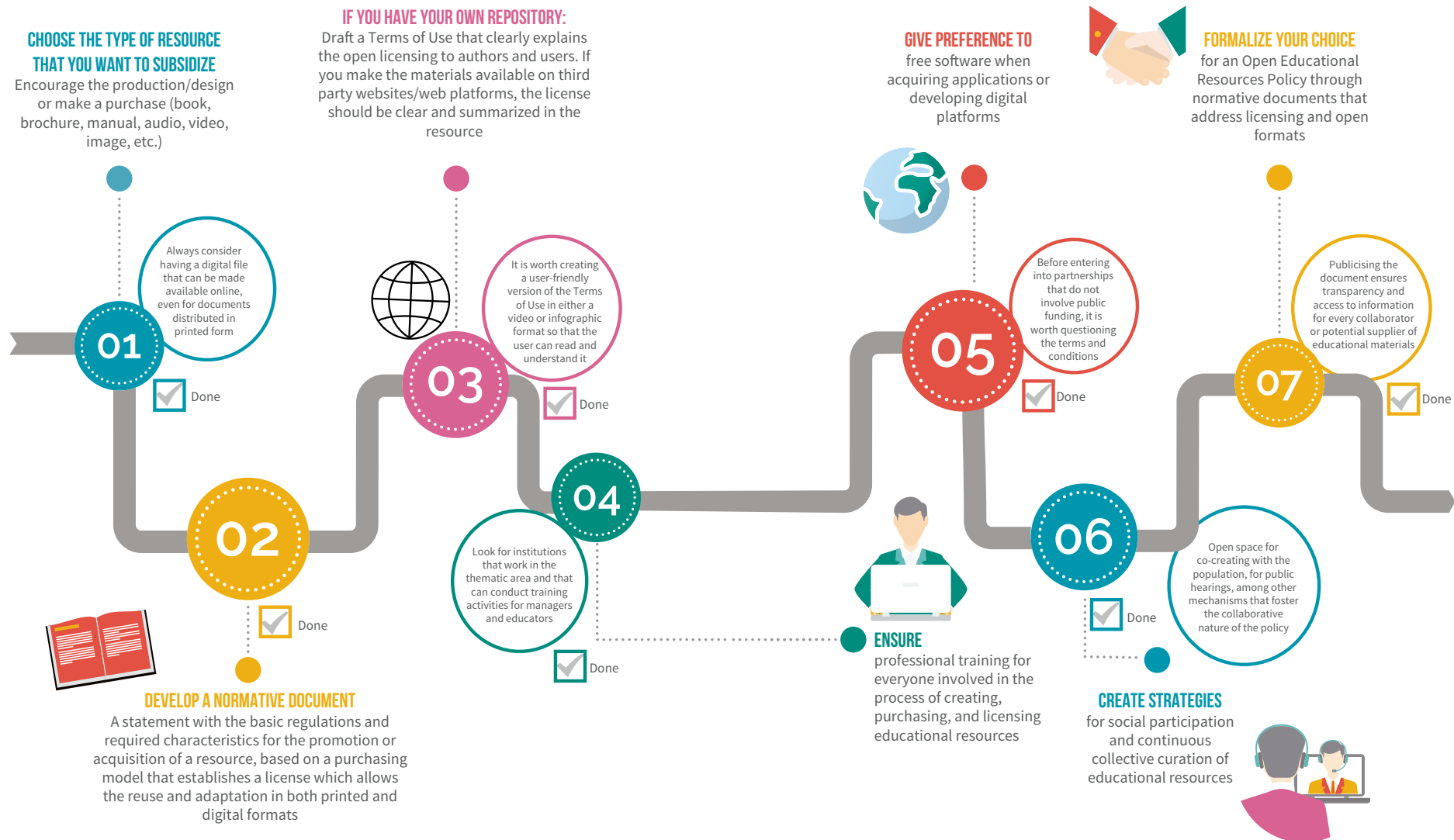
In September 2021, we found that of 448 South American public higher education institutions, 79% were using Big Tech services.²⁷ It is critical that the OE movement around the world draws attention to the lack of regulation governing partnerships between public education

institutions and commercial organisations. At present, these partnerships compromise citizens’ right to privacy and personal data protection, particularly that of children and adolescents. Education policy makers and managers must rethink their role in relation to the choices faced by public education regarding digital technologies, as well as promoting professional development for educators to help them navigate technological choices, and raise awareness of the risks of digital tools and platforms among students.

Furthermore, we must remember that OE and OER policies are not only about making a greater number of resources available to more people. They also address inclusion and equitable participation, and consider how educational resources “speak” from particular vantage points. This involves an investment of time and effort in creating the conditions for diverse groups to “speak” through educational resources – to create, remix, share and disseminate their voices.



Figure 5
Checklist of how to implement an Open Education Policy



Source: Gonsales, Sebriam and Markun (2017). Como Implementar Uma Política De Educação Aberta. Licenced Under Creative Copyright (CC).

METRICS AND INTERNATIONAL EDUCATION POLICY

Sotiria Grek

Professor in European and Global Education
Governance at the University of Edinburgh School
of Social and Political Science, Scotland

Key takeaways: the role of metrics in international education policy

- The production of statistical data in education has been instrumental in expanding what we know about education systems, revealing inequities and improving the quality of education for all globally.
- At the same time, an overreliance on the production of education data, rankings and indicators, has had significant distorting effects on the democratic participation in education decision-making. It has also led to a policy focus on aspects of education that can be measured, versus education's immeasurable – yet highly valuable – contribution to human and social flourishing.

The governance of education is rapidly changing. “Super-wicked” problems, enduring inequalities, diverse actors and overlapping agendas have led to increasing complexity and uncertainty about national and global responses to educational crises. One approach to this growing complexity has been a focus on increasing the amount and quality of statistical knowledge that diverse national and international, state and non-state actors produce to coordinate and ignite action.

Indeed, since the middle of the 20th century, despite a multiplicity of actors, crises and fields of action, international education policy has known one constant: the ubiquity of metrics in attempts to produce knowledge to govern it. These measurements (such as school league tables or world university rankings) have become proxies for countries' education performance and even their future economic prosperity. They have also become the means by which different entities – multilateral and bilateral funding organisations, non-governmental and philanthropic organisations, and countries themselves – set priorities about education and development investments, and make policy decisions.

This prominence of metrics and quantification as “technologies of government”²⁸ in international education policy is visible not only

in their expansion into new spaces but also in the political effects they achieve. As they function to frame issues, link policy instruments and connect diverse actors, metrics have become, in fact, the central venue for education “policy work”.²⁹ As such, their production is central to understanding and improving education governance domestically and internationally.

Two prominent examples of the role and significance of metrics in education are the Organisation for Economic Cooperation and Development's (OECD) Programme for International Student Assessment (PISA) and the introduction of the Sustainable Development Goal 4 (SDG4) on quality and equity in education globally. On the one hand, PISA, by ranking the education performance of different nations, became instrumental in fundamental policy changes in several European nations and beyond: with its focus on decontextualising education and measuring what 15-year-olds “can do” with the knowledge they gain at school, it radically shifted both the discourse and policy direction of contemporary education systems globally. On the other hand, SDG4, despite its emphasis on participation and inclusivity of diverse educational voices, is in essence a monitoring exercise: SDG4 involves collecting statistical data on a range of education issues

and also transforming the technical spaces of data production into the supposed democratic venues where future policy directions are decided. This is due to the SDGs' broader remit and commitment to be “country-led”, rather than decided upon by international organisations and powerful countries only (one of the critiques made of the Millennium Development Goals). The SDGs' concept of “country ownership” has therefore had important implications on widening the legitimacy, acceptability and thus political momentum of the project, with significant effects in a number of policy areas, including education, especially in countries of the Global South.

These developments simultaneously politicise numbers *and* advance an approach to education as a technical problem, which is already having real impacts on what is funded, what receives attention and how countries – especially those with limited available resources – prioritise national policies. This is a challenge for democratic participation in education decision-making and has led to a policy focus on the aspects of education that can be easily measured. In contrast, it has diminished our focus on education's immeasurable – and yet highly valuable – contribution to human and social flourishing.



3 PRIVATISATION AND THE DIGITALISATION OF EDUCATION

In 2019, the Abidjan Principles on the human rights obligations of states to provide public education and to regulate private involvement in education were adopted at a conference in Côte d'Ivoire.³⁰ The principles emerged out of a need to respond to increasing and evolving private involvement in education, and the risks that this poses to the right to education.

There is now a considerable body of research that analyses the effects of privatisation on education and attempts to present policy responses. However, far less research looks at the relationship between privatisation and digitalisation, and how this impacts public education. As the contribution from Janja Komljenovic describes, new arrangements

between private organisations, schools and governments exist in the digital sector, propelling new forms of privatisation. As Theresa Adrião explores, this has profound consequences for pedagogy, curricula, and the direction and stability of public education. This in turn has new implications for policy responses, particularly in emergency contexts, as the Inter-Agency Network for Education in Emergencies (INEE) outline.

Whilst the nature of private engagement in education is far from static – and while policy responses must also evolve – Audrey Watters reminds us to keep in mind the long history of education technology, and the lessons that have for decades been learnt, forgotten and revisited.

READING AND RESOURCES

- Theresa Adrião recommends her co-authored article *New forms of privatization of educational management in Brazil: corporations and the use of digital platforms*.
- The Inter-agency Network for Education in Emergencies (INEE) recommend their Advocacy Brief *Private Engagement in Education in Emergencies: Rights and Regulations*, alongside their webinar on the same topic.
- Janja Komljenovic recommends her 2020 paper *The future of value in digitalised higher education: why data privacy should not be our biggest concern*, along with the book *Assetization: Turning Things into Assets in Technoscientific Capitalism*, edited by Kean Birch and Fabian Muniesa.
- Audrey Watters recommends her blog, Hack Education, where her books – including *The Monsters of Education Technology* – can also be found.



ASSETISATION: WHAT IS IT AND WHY IS IT IMPORTANT?

Janja Komljenovic

Senior Lecturer, Department of Educational Research at Lancaster University, England

Key takeaways: assetisation: challenges and opportunities for education policy

- Making EdTech owners accountable to the public.
- Controlling predatory lock-in and monopoly exploitation, in which users are made dependent on a single company.
- Ensuring democratic and relational data governance.

The nature of education is changing as its products and services are digitalised in the form of assets. Assetisation is a distinct way of generating value, and raises new challenges for education systems and policy. Its implications are made clearer by talking through some examples.

Tina is ten and is one of five million children who use an app to help them learn math. Her parents pay a monthly subscription fee. The app applies artificial intelligence (AI) to personalise the pace and content of her progression.

José is a teacher of philosophy using an app to design and deliver short courses. The app connects tens of millions of users interested in sharing and acquiring different skills. José gets paid for his course depending on his popularity and user ratings, and the platform keeps a 75% share of his income.

Rizwana is a professor of medicine. She uses virtual reality software in her class to simulate performing an operation. The software records students' actions and Rizwana instantly receives analytics and predictions about her students' performance, along with concrete recommendations on her actions to support them.

These three examples are fictional, but representative of the proprietary digital platforms we find in education. Platforms are protected by a software licence and terms of use. They are *assets*: a resource that generates value and economic benefit as a result of ownership and control rights. Owners can be understood as rentiers, who extract value from controlling the assets (instead of producing commodities for a one-off sale in the market). Three key points here are particularly relevant for policy and practice.

The first is about who controls teaching and learning, research, and institutional management processes, as they are run on proprietary platforms. When looking at private actors in education thus far, we tended to think about them in terms of commodification. In the case of commodities, there would be an exchange of ownership rights when products and services are sold and bought. But in the case of assets, all ownership, follow-through and control rights stay with the asset owner. It is the platform owner who makes decisions about access to the platform, how users interact, what they can or cannot do. The platform makes content and pedagogic decisions, and structures the learning process, as well as social

and economic relations on the platform. In other words, it sets the rules of the game.

Second, an asset brings perpetual economic benefit in future via economic rent. In the digital world, economic rents are typically subscriptions or fees (such as per click, per view, or per user). Instead of one-off payment as for commodities, assetisation brings students, staff and education institutions into a continuous relationship with the platform owners. The more users are technologically, legally or pragmatically locked-in into a particular platform, the more power the platform owner has to increase the cost of accessing and using the platform. Conditions of use can unilaterally change if the owner issues new terms of use, decides to sell the platform, or if the company is acquired by new owners.

Finally, digital platforms collect user data when users engage with them, such as the content they post on the platform, individual click-through behaviour, the time they spend doing particular things, the sequence of their actions, their IP address, their machine ID, and so on. Such user data can be made valuable in different ways and constructed as assets. Data becomes valuable when aggregated,



analysed and turned into intelligence. At the moment, discourse in EdTech and education more generally places high bets on data-rich processes such as personalisation and automation to support efficiencies and effectiveness in the sector. In reality, we are seeing only the early stages of such operations in education. There is lots of experimentation of how user data can be turned into intelligence for the benefit of platform users. But as many of these processes are black-boxed for reasons of commercial sensitivity, little is known about their effects or how much value the aggregated user data produces. Another key issue is, therefore, who has access to user data and benefits from its future value.

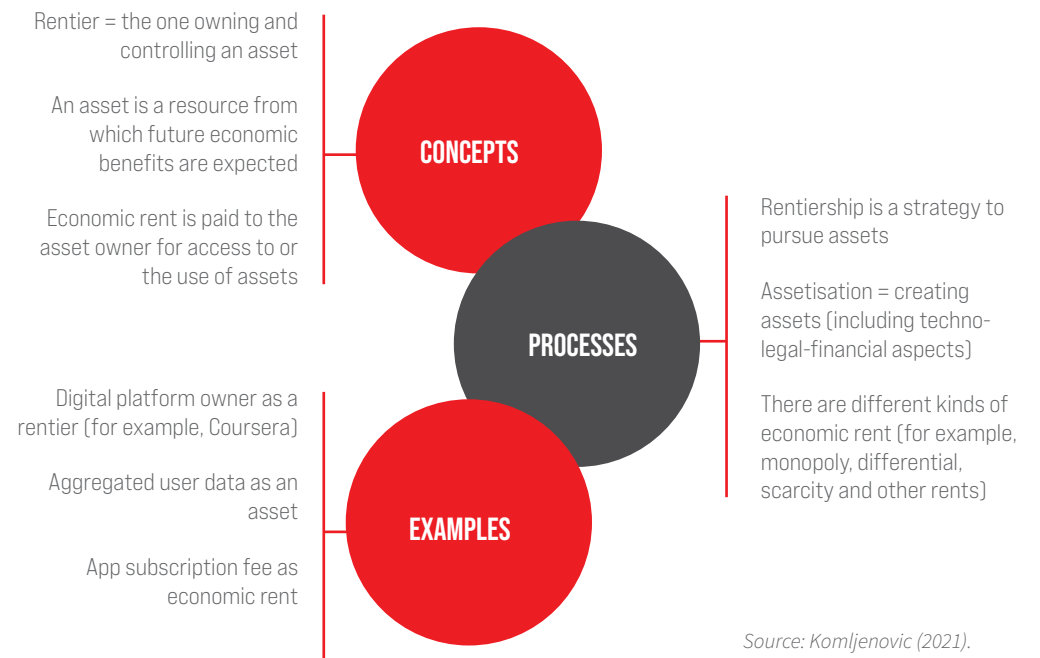
Assetisation: challenges and opportunities for education policy

- Making EdTech owners accountable to the public. The UK Digital Futures Commission report (2021), for example, recommends: that experts from regulatory bodies work with the Information Commissioner's Office (ICO) to assess EdTech products and their impact; that the Ministry of Education and ICO create a public list of EdTech companies used by education institutions and those that are suitable for procurement; that the ICO conduct random independent audits of EdTech companies; and that EdTech companies publish product Impact Assessments

on Child Rights and Data Protection, to allow for public and civil society oversight of companies.³¹

- Controlling predatory lock-in and monopoly exploitation, in which users are made dependent on a single company. For example, Kean Birch argues for establishing pre-emptive regulation to guard against the monopoly practices of Big Tech companies.³²
- Ensuring democratic and relational data governance. A key challenge is assessing how currently private data assets might be made publicly available, so that user data could be accessible to everyone for ethical and socially just innovation. Salome Viljoen argues for democratising the governance of data³³ – and these issues are also addressed by Paul-Olivier Dehaye and Jessica Pidoux (Theme 1), Neil Selwyn (Theme 2) and Jennifer Forestal (Theme 5) in this collection.

Figure 6
Overview of assetisation concepts



Source: Komljenovic (2021).

PRIVATE ENGAGEMENT IN EDUCATION IN EMERGENCIES: RIGHTS AND REGULATIONS

Asim Latif

Coordinator of the INEE Reference Group on Distance Education, Inter-agency Network for Education in Emergencies (INEE)

Key takeaways: recommendations for private engagement in EiE

- Prioritize the “do no harm” principle of humanitarianism.
- Prioritize the participation of affected communities.
- Support the long-term sustainability of public education.
- Regulate private sector activities.
- Promote transparency in profit-seeking activities.
- Ensure that private funding to EiE is transparent, equitable, and harmonized.
- Develop specific guidance on private participation.
- Prioritize substantive R&D.

Efforts to secure inclusive and equitable education for all have prompted calls for greater engagement by the private sector, asserting that businesses and foundations can play significant roles as partners in achieving Sustainable Development Goal 4 (SDG4). In recent years, given shortfalls in public financing and the need for urgent responses, private actors have increasingly become involved in various aspects of EdTech programming under education in emergencies (EiE).

This arrangement, however, can produce tensions between private engagement and humanitarian response in education, which need to be addressed and require extra coordination, advocacy and attention. It is imperative that private entities promoting EdTech consider the unique challenges and learning needs of the most marginalized in EiE contexts.

INEE has laid out some key recommendations to support the prioritization of safe, equitable, and quality public education for all children and young people affected by crises.³⁷

These recommendations urge policy and decision makers to prioritise the principles of humanitarianism, the participation of affected communities and the sustainability of public education. They also highlight the need for guidance, regulation and transparency.

Key recommendations for private engagement in education in emergencies (EiE)

1. Prioritize the “do no harm” principle of humanitarianism. All private sector activities in EiE must adhere to the “do no harm” principle and ensure the educational rights of affected populations.
2. Prioritize the participation of affected communities. Without active community input, business-supported interventions risk decontextualized design and implementation that are misaligned with local interests and knowledge systems, leading to poor educational results and potentially discriminatory practices that produce, sustain, or exacerbate conflict.
3. Support the long-term sustainability of public education. Effective private sector involvement in EiE requires a sustained and ongoing commitment to public education.
4. Regulate private sector activities. Private actors involved in education in emergencies must be regulated by the State and held to the same accountability principles as other non-governmental actors and state agencies/entities, in line with legally binding international human rights standards to ensure quality, equity, and access, especially with regard to learners and families affected by crisis.
5. Promote transparency in profit-seeking activities. Transparency regarding conditions of funding and profit-seeking activities, such as creating new markets for products, brand association and product testing, may help to identify conflicts of interest that counter the “do no harm” principle.



6. Ensure that private funding to EiE is transparent, equitable, and harmonized. Private financing for EiE must not undermine the responsibility of the State to provide free quality education to all children and young people.
7. Develop specific guidance on private participation in EiE. Given the unique issues relating to private sector participation in EiE, an addition to the Abidjan Principles³⁸ that directly addresses these issues would help clarify expectations for State and private sector responses and intervention in such situations.
8. Prioritize substantive R&D while developing digital content, learning management systems and for supporting tech-based pedagogical models in EiE contexts. The learning needs of the most marginalized requires all players to contextually understand their learning environment at the design stage to ensure effective EdTech programming.

Table 1

Forms of engagement in education in emergencies by for-profit entities

Form of Engagement		Types of For-Profit Entities Involved	Examples of Activities in Education in Emergencies
Financing	- Global finance/aid to education - Corporate social responsibility programs - Business financing - Foundation grant- making, funding - Tuition and non- tuition (e.g. uniforms) payments for schooling - Investments	- Corporate foundations - Companies - Private benefactors	- Rapid response aid to EiE - Funding private school operators when public system is unsafe/ decimated
Provision	- Core education services, school provision - Learning materials (e.g. technology, textbooks) - Supplementary core education services (tutoring) - Non-core services (e.g. infrastructure, food services)	- Fee-charging private school operators (large chains and single schools) - Non-fee charging schools run by private providers through PPP mechanisms - Private tutors - EdTech producers - Companies providing food services; construction	- Low-cost private schools established where public schools decimated - Post-disaster reconstruction of school infrastructure - Dissemination of educational technology for refugee and mobile populations
Policy Making	- Global governance bodies - Policy working groups - Local education groups - Business coalitions	- Global businesses, global corporate foundations - National and regional businesses and foundations	- Private participation in global partnerships which fund EiE (e.g. ECW; GPE) - Coalitions of private actors (e.g. GBC-E) - Local education policy working groups in crisis contexts which include private sector
Knowledge and Innovation	- Research - Technology - Innovative pedagogy guidance	- EdTech companies - CSR initiatives - Research institutes, think tanks - Grant-making foundations	- Grant-making for research and innovation - Mobile learning initiatives - Hardware development and distribution to refugees - Software development for virtual learning
Advocacy	- Educational rights advocacy - Lobbying - Network activities	- Media - Philanthropists - Business CEOs	- Private engagement in advocacy networks (e.g. INEE) - Media coverage - Business/celebrity activism and awareness raising

Source: INEE (2020). *Private Engagement in Education in Emergencies: Rights and Regulations*. Adapted from UNESCO (2021).

A HISTORY OF EDUCATION TECHNOLOGY

Audrey Watters

Writer and independent scholar, author of *The Monsters of Education Technology and Teaching Machines: The History of Personalized Learning*³⁹

With the outbreak of COVID-19 and the move online, many pundits once again predicted that this was EdTech's moment to shine. However, the pandemic demonstrated how many of the ongoing challenges of EdTech persist: many students still do not have access to devices or high-speed Internet; concerns about the privacy and security of student data abound; and questions around which types of interactions are best done online or via computer-assisted instruction remain. Crucially, EdTech still involves only a small portion of what happens each day in face-to-face learning scenarios at school.

Although proponents frequently tout the innovations of education technology (EdTech) and its potential to transform education, many of the theories and practices of digital learning pre-date today's technologies. Psychologists in the early twentieth century believed that machines could automate teaching and testing, and technologies like radio and film were introduced into classrooms decades before computers — often with similar justifications as we hear today: technologies will “personalize” education; allow teachers to work with more students; and allow students to move at their own pace through course materials. EdTech might seem new, but it has a long history.

Universities were the primary sites for the development of computing in the 1950s and 1960s, and some of the earliest applications of computers were in education. Indeed, students and faculty were among the key co-developers of many aspects of computing, including new programming languages, software applications, and hardware extensions. Early mainframe computers were used for what became known as “computer-assisted instruction” or CAI. Modeled on the work of the behaviorist B. F. Skinner, CAI presented a student with a question to which they had to key in a response.

Some systems would simply record whether the answer was right or wrong; others would congratulate the student for a correct answer or ask the student to try again with a wrong one. These systems would record each student's progress so that, ideally, the questions would match their skill level.

MIT professor Seymour Papert vigorously opposed this type of EdTech, viewing it as a misuse of the potential of computers for learning. Papert and his colleagues developed the programming language LOGO based on his theory of learning: that knowledge was developed through construction, not instruction. In his 1980 book *Mindstorms*, Papert wrote that “In most contemporary educational situations where children come into contact with computers the computer is used to put children through their paces, to provide exercises of an appropriate level of difficulty, to provide feedback, and to dispense information. The computer programming the child.” Papert wanted that relationship reversed: “The child programs the computer.”⁴⁰

The divide between “instructionist” and “constructionist” approaches to digital learning continued, even as computing moved from

mainframes to PCs. Arguably, there were elements of the constructionism in aspects of the early visions of Apple, which often touted the possibilities of creative computing for education. As personal computers became more popular (and affordable) and as Microsoft increased its market share, the push for digital learning was less likely to come from one or two innovative teachers in a school (or from innovative thinkers like Papert) and rather to be controlled by administrative and technical staff. Bill Gates stepped down from his position as the CEO of Microsoft in 2008, turning his focus to philanthropy; his foundation has since poured billions of dollars into education technology initiatives.⁴¹

As with advances in computing, much of the development of Internet technologies also occurred at universities. The Internet, and soon after the World Wide Web, were viewed as a boon to research, but also to the facilitation of distance education. During the “Dot Com” era of the early 2000s, there were many promises about online education, with universities like Yale investing heavily in initiatives to offer alumni access to college-level (but un-credited) courses. These initiatives never quite succeeded, and when the Dot Com boom bust,



many soured on the promises of EdTech. But as access to the Internet continued to spread, along with students' access to their own mobile devices, interest was renewed. Internet technology companies like Google entered the market, competing with incumbent players to provides software and hardware for schools.

The New York Times declared 2012 “the Year of the MOOC” following the immense interest (and investment) in “massive open online courses” that year.⁴² These courses, which attracted millions of students, were hailed as an alternative to the high cost of college tuition. But like their predecessors, these courses did not offer college credit and the completion rates were abysmal. MOOCs have retained some of their popularity, but companies now charge for many of their classes.

In their 2008 book *Disrupting Class*, Clayton Christensen and Michael Horn predicted that by 2019, half of all high school classes would be taught on the Internet.⁴³ Like many of these predictions about the future of learning, they were incorrect. While more and more students did take courses online (and more and more schools turned to “blended learning”), most students continued to experience education in brick-and-mortar settings. That is, until 2020 when COVID-19 forced most into digital learning.

With the outbreak of COVID-19 and the move online, many pundits once again predicted that this was EdTech's moment to shine. However, the pandemic demonstrated how many of the ongoing challenges of EdTech persist: many

students still do not have access to devices or high-speed Internet; concerns about the privacy and security of student data abound; and questions around which types of interactions are best done online or via computer-assisted instruction remain. Crucially, EdTech still involves only a small portion of what happens each day in face-to-face learning scenarios at school.

THE DIGITALISATION OF EDUCATION AND FINANCIAL MARKETS

Theresa Adrião

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Key takeaways: consequences of the role of financial markets in the digitalisation of education for the right to education

1. The “frenzy of innovation” via apps, content and gamification makes it difficult for school teachers and students to provide pedagogical input, leading to approaches that are increasingly removed from the reality and needs of where they live.
2. The digitalisation of teaching and learning processes converts them into financial assets (see the contribution from Janja Komljenovic above) that are traded on the stock market, and thus subject to the volatility of that market, rather than being subject to learners or teachers.

In this contribution, I draw attention to how the subordination of digital education to financial markets poses a threat to the right to education. I specifically highlight two aspects of the subordination of the digitalisation of teaching-learning relationships to financial markets.

First, it is vital that we pay close attention to criticisms and concerns that arise from the market concentration of website domains and access rights for digital teaching tools and technologies. Many of these tools and technologies are in the hands of transnational ICT oligopolies. That means that the market for digital technologies in education is dominated by a small number of companies and these companies benefit from a very limited amount of market competition. This has consequences for how educational content and applications promoted are developed.

Often, oligopolies in digital technologies consist of start-ups developing products with the financial support of investment funds (private equity or venture capital), whose main interests are company capitalisation and returns on their investment. Due to the nature of these relationships, there is no social or even technical control over the content and teaching

strategies developed and then implemented in countless education systems. They are almost “automatically” adopted by students, teachers and families.

In some cases, such as Brazil, this trend is being further encouraged by “venture philanthropy”, a term coined by the OECD in 2014.³⁴ Venture philanthropists play a complex and a dual role: on one hand, they promote the use of apps and digital content as alternatives that improve public education, but, on the other, they also profit from financial returns derived from the success of start-ups funded by the for-profit corporate arm of a philanthropic funder. This cycle undermines the ability of teachers, families and even public authorities to choose what and how they teach.³⁵

Secondly, through digitalisation, teaching and learning processes are transformed into financial assets. These digital transformations are fed by personal data, which is increasingly subject to more or less effective regulations, and features heavily in discussions and disputes in different contexts (see Theme 2 in this collection). More fundamentally, these transformations are also fed by algorithms: mechanisms for which social control and public

transparency are incredibly difficult to enforce.³⁶ “Personalised” products and services are developed by applying algorithms to the data profiles of those accessing digital tools, which, in turn, suggests that their impact on education management and the organisation of public education systems deserve further analysis.

Thus, evidence suggests that education that is dependent on privately-controlled digital tools is caught between two apparently contradictory processes: on one hand, the uniformity and standardisation of curricula (which was, in fact, already under way before digitalisation) and on the other, customisation when it comes to controlling the pedagogical activities of schools and teachers as well as testing student performance (such as “personalised learning”).

4

DIVERSITY, DIGITAL DIVIDES AND DIGITAL EDUCATION

Several of the contributions in this collection highlight how the risks and rewards of the digitalisation of education are unevenly distributed – between stakeholders in education, across communities of learners, and between and within nations and geographies. This theme explores aspects of the relationship between diversity, digital divides and digitalisation, looking at the challenges – but also vitally the solutions – being posed by experts bringing fresh and critical perspectives to bear.

Using an intersectional approach, Janet Kwami outlines how education policy might understand and navigate multiple digital divides. Exploring gender, disability and global North-South dynamics, Nidhi Singal proposes ideas for how research and policy might better address inclusion and disability Southern contexts. Émeline Brulé takes up some of these themes from a design perspective, highlighting how policy makers and educators might think more carefully about designing for inclusion. And, in a contribution on behalf of the Maiam nayri Wingara – the Australian Data Sovereignty Collective, Jacob Prehn outlines key concepts in Indigenous Data Sovereignty, as they intersect with the digitalisation of education.

READING AND RESOURCES

- Emeline Brulé recommends this blog *Can Technology Make Education Inclusive?*, published on the platform Hypotheses, where she expands on some of the ideas in her contribution.
- Janet Kwami recommends Amy Antonio and David Tuffley's 2014 paper *The Gender Digital Divide in Developing Countries*, Sasha Costanza-Chock 2020 book *Design Justice: Community-Led Practices to Build the Worlds We Need* and Paul Attewell's foundation article on *The First and Second Digital Divides*, published in 2001. Dr. Kwami also suggests readers take a look at the EQUALS Global Partnership for Gender Equality in the Digital Age.
- Jacob Prehn recommends an article co-authored with colleagues in 2021, on *Indigenous data sovereignty in the era of big data and open data*. He also points readers to the CARE Principles for Indigenous Data Governance.
- Nidhi Singal recommends the 2021 systematic review *EdTech for Learners with Disabilities in Primary School Settings in LMICS*, published by the EdTech Hub.



AN INTERSECTIONAL APPROACH TO ELIMINATING DIGITAL DIVIDES

Janet Kwami

Janet Kwami, Associate Professor of
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Key takeaways: priorities for an intersectional approach to addressing digital inequities

- Adopt holistic frameworks that build technology literacy and capacity, and provide support beyond the physical confines of schools to include the home and community.
- Link discussion about the digitalization of education with social movements for educational justice.
- Address ethical issues related to frontier technological developments.
- Collect gender-disaggregated data and measure gender digital inequities as well as other divides that are multifaceted.

Digital technologies are often touted as inherently empowering tools for addressing social inequities without a critical analysis of who and how they empower or disempower. It is even more problematic that many discourses about today's digital society fail to recognize new disparities in access, adoption and use that arise with digital technologies – and that differently impact the experiences of underrepresented and marginalised groups. Failure to interrogate power is detrimental to marginalised groups – including women, Indigenous groups, people of colour, differently-abled, those on lower-incomes, etc. – as we seek to create a more digitally inclusive society.

Many digital education initiatives conceptualize ownership, childhood, and education from a Western-centric perspective that fails to account for the cultural construction of gender, childhood, education, and leisure. This results in the problematic deployment of information and communication technologies (ICTs) projects in Southern and Eastern contexts, in which digital inequities rooted in fundamental social and structural problems that affect the right to education are not addressed.⁴⁴ Instead, we must ensure that the cultural contexts of digital technology in education are addressed

with regards to both access and use. For example, gendered variables that exacerbate digital inequity in education include societal/cultural norms and household obligations that impact different genders differently.⁴⁵

Digital inclusion requires intentional strategies and investments to reduce and eliminate historical, institutional and structural barriers to the access and use of technologies that are vital for participation in today's digital society. The journey to digital parity is not a question of access to technology alone. It also requires addressing how digital technologies can be used to facilitate empowerment: economic, professional and livelihood opportunities, political and structural reforms, and educational opportunities.

This involves:

- Providing affordable, robust infrastructure that is equitable and scalable
- Providing internet-enabled devices that meet the needs of a diversity of users
- Building digital literacies and competencies to support digital citizenship

- Designing humane and ethical technology
- Addressing bias, diversity, inclusion and equity in the tech industry
- Creating culturally appropriate applications and content to enable self-sufficiency, participation and collaboration
- Advocating for and centring difference in the design of digital technologies.

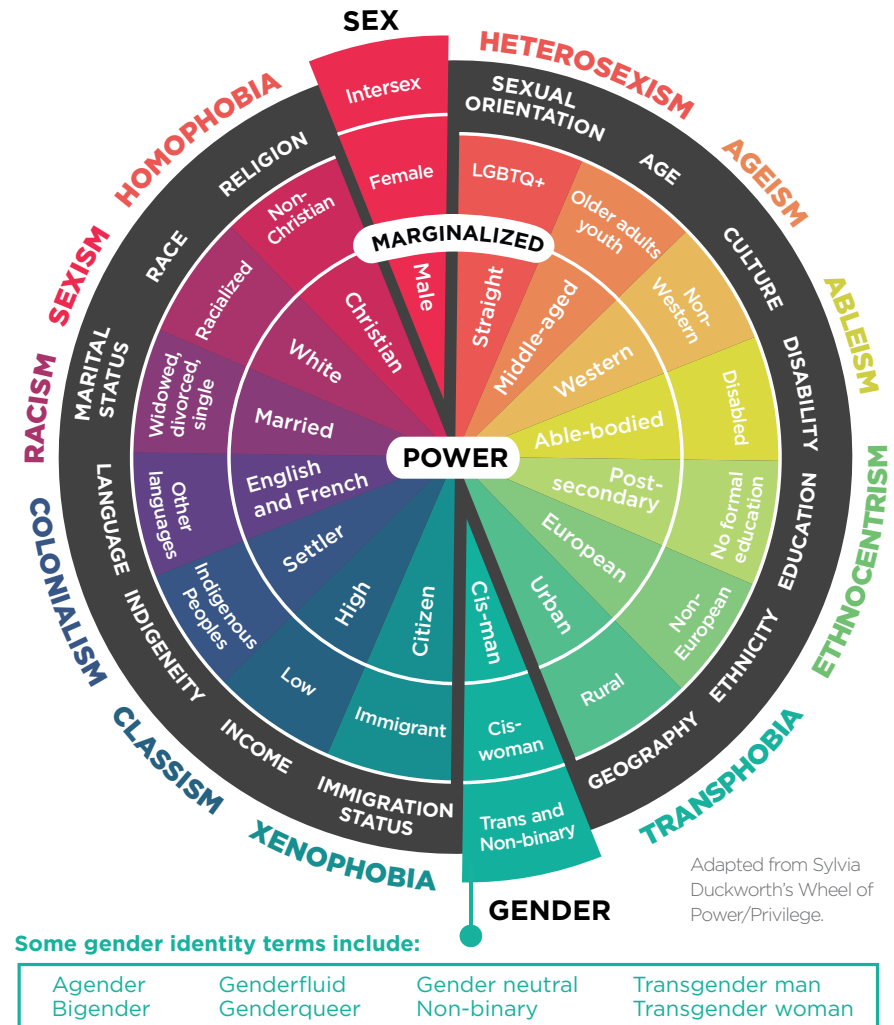
The relationship between diversity and digitalisation requires that stakeholders adopt an intersectional framework that considers gender, ethnicity, religion, rural/urban location, and other intersections that affect what students and teachers bring to their learning experiences and therefore the ways in which these technologies may widen rather than reduce digital inequities. An intersectional approach within digital inclusion educational initiatives and policies addresses how the access and use of ICTs are intertwined with larger social, economic, political, and cultural issues that have implications for opportunities for economic mobility and social participation.

Priorities for an intersectional approach to addressing digital inequities

- Adopt holistic frameworks that build technology literacy and capacity, and provide support beyond the physical confines of schools to include the home and community. Digital education that focuses only on the school creates a disconnect, as less-resourced students may not be able to count on support outside of school. A strategy for reducing this gap is to build the capacity of parents and mentors alongside that of children/ students.
- Link discussion about the digitalization of education with social movements for educational justice. This requires connecting and designing justice work with students, teachers, and parent-led community organising groups locally and globally that focus on addressing injustices and inequalities in educational systems.
- Address ethical issues related to frontier technological developments such as virtual reality, artificial intelligence (AI), robotics, and biotechnology, all of which raise tremendous opportunities for transforming and digitising education but can also further exacerbate new and pre-existing digital inequities.

- Collect gender-disaggregated data and measure gender digital inequities as well as other divides that are multifaceted. For example, even though digital tools have the potential to empower women, there is a gender gap reported in many studies. Bridging gender inequities requires measuring gendered gaps with regard to access, use and the impacts of digital technologies. There are currently no clear targets in place to monitor global or national ICT policy objectives or for the collection of gender-disaggregated data that would allow us to evaluate policy successes and failures.

Figure 7
Sex-Gender-Power-Wheel



Source: CIHR (2021) adapted from Sylvia Duckworth, Wheel of Power/Privilege is licensed under CC BY 4.0. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>

INDIGENOUS DATA SOVEREIGNTY AND EDUCATION

Jacob Prehn

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Key takeaways: what is Indigenous Data Sovereignty and how can it be applied within the digitalisation of education?

- Indigenous peoples have the right to control what they consider to be educational priorities as outlined in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).
- Indigenous Data Sovereignty reflects the right of Indigenous peoples to exercise ownership over Indigenous Data.
- The internationally developed CARE principles for Indigenous Data Governance is a respectful method of advancing Indigenous rights in the digitisation of education.
- Not all Indigenous knowledges can be digitised due to cultural sensitivities.

Indigenous Data Sovereignty and Indigenous Data Governance reinforce the rights Indigenous peoples have to control what they consider to be educational priorities. This allows for self-determination and empowerment in the rapidly changing landscape of the digitisation of education, rather than the state assimilating Indigenous peoples into their education systems. The principles of Indigenous Data Sovereignty and Indigenous Data Governance help protect and advance diversity, access, quality, and equity in digital education for Indigenous peoples.⁴⁶

The definitions of Indigenous Data, Indigenous Data Sovereignty, and Indigenous Data Governance vary internationally between Indigenous peoples. In Australia, Aboriginal and Torres Strait Islander peoples define these concepts as:

- **Indigenous Data** refers to information or knowledge, in any format or medium, which is about and may affect Indigenous peoples both collectively and individually.
- **Indigenous Data Sovereignty** refers to the right of Indigenous peoples to exercise ownership over Indigenous Data. Ownership of data can be expressed

through the creation, collection, access, analysis, interpretation, management, dissemination, and reuse of Indigenous Data.

- **Indigenous Data Governance** refers to the right of Indigenous peoples to autonomously decide what, how, and why Indigenous Data are collected, accessed, and used. It ensures that data on or about Indigenous peoples reflects our priorities, values, cultures, worldviews, and diversity.⁴⁷

The key principles of Indigenous Data Sovereignty and Indigenous Data Governance are underpinned by the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).⁴⁸ Numerous Articles of the UNDRIP raise urgent questions about the manner in which nations statistically represent their Indigenous citizens.⁴⁹

When considering the digitalisation of education key issues include Indigenous rights to the state education system but also to self-determine their educational priorities,⁵⁰ and that not all Indigenous knowledges should be digitised for educational purposes.

What is Indigenous Data Sovereignty and how can it be applied within the digitalisation of education?

1. Indigenous peoples have the right to control what they consider to be educational priorities as outlined in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). Indigenous people's priorities, values, cultures, worldviews, and diversity should be reflected in the digitisation of education.
2. Indigenous Data Sovereignty reflects the right of Indigenous peoples to exercise ownership over Indigenous Data. Within education, Indigenous Data is a key issue because digitalised education requires the transformation, use, and the transfer of ownership of data about learners in new ways.
3. The internationally developed CARE (Collective Benefit, Authority to Control, Responsibility, and Ethics) principles for Indigenous Data Governance is people and purpose-oriented, and a respectful method of advancing Indigenous rights in the digitisation of education.⁵¹ They complement the FAIR principles (findable,

accessible, interoperable, reusable) used within the open data movement.

4. Not all Indigenous knowledges can be digitised due to cultural sensitivities. In these instances, Traditional Knowledge (TK) and Biocultural (BC) Labels provide a respectful method of navigating the space.⁵²

Figure 8
CARE Principles for Indigenous Data Governance



Source: Research Data Alliance International Indigenous Data Sovereignty Interest Group. (September 2019). CARE Principles for Indigenous Data Governance. The Global Indigenous Data Alliance. Led by Stephanie Russo Carroll and Maui Hudson. Available at: [GIDA-global.org](https://gida-global.org).

INCLUSION AND DISABILITY IN SOUTHERN CONTEXTS

Nidhi Singal

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Key takeaways: how might we invest in better evidence, and better policies, for more inclusive education?

- Focus on how research investments can support the alignment of technology with learning and curriculum goals.
- Keep both “access to learning” and “learning to access” in mind.
- Take a twin-track approach.

The digitalisation of education impacts in complex ways on the rights to education for children with disabilities living in Southern contexts. It is useful to start with how these issues are broadly understood. Disability is an outcome of interactions between health conditions (such as diseases, disorders, and injuries) and contextual factors.⁵³ Among contextual factors are external environmental factors (for example, social attitudes, legal and social structures, natural and built environment, products and technology); and personal factors, which include gender, age, social background, education, motivation, and self-esteem, all of which can influence how much a person participates in society. This view of disability, which positions it as part of the human condition, also adopts a more interactionist approach with the environment. As Janet Kwami’s contribution to this theme highlights, people with disabilities are not a homogeneous group, and many intersectional variables need to be acknowledged, such as gender, age, location and so on, all of which have an impact on levels of participation.

Over the last few years, the digitalisation of education has seen rapid advancement. While the integration of technology into teaching

and learning is not new, the pace of change has been phenomenal, and has opened up new opportunities for those with disabilities. Links between policy-led decision making on disability and education and the research evidence that informs it are complex. At present, literature in the global South is dominated by work on the testing and evaluation of software and programmes.⁵⁴ Many studies explore new accessibility technologies and how they can be used for children with disabilities. Such initiatives are commonly funded through international NGOs, but often implemented with little attention to context and little regard to the sustainability of the programme. Also notable in the literature is a focus on teacher’s attitudes, confidence and preparation to use EdTech. And internationally, developments have taken place in relation to capturing the prevalence of disability through Education Management Information Systems (EMIS)⁵⁵. However, innovation regarding how to best use this data effectively remains a low priority. These foci raise interesting and challenging questions about where responsibility is placed in the drive towards digitalisation and whose knowledge – about education and about technology – influences decision making.

In a systematic review published in 2021 a team of researchers found that in studies of EdTech for learners with disabilities in lower- and middle-income contexts, “education” is largely absent from research on “education technology”.⁵⁶ There is very little engagement with pedagogy, learning engagement and learner outcomes. What’s more, the geographical spread of evidence is extremely limited. Evidence is concentrated in very few countries: India, Thailand, and Kenya top the list in the global South, but with fewer than 10 studies in each of these countries. Critically, this literature is dominated by research in special schools, that is, schools which are exclusively designed for children with disabilities. If our aims are to support and advance inclusive, high-quality education, they are poorly served by this limited and uneven evidence base.



How might we invest in better evidence, and better policies, for more inclusive education?

➤ Focus on how research investments can support the alignment of technology with learning and curriculum goals.

Rather than just focusing on technology per se, it is important to ensure that technology responds to the central vision of education, and that part of the puzzle currently is missing. Limiting the focus only to issues of access does not take into account the need for inclusive and equitable quality learning experiences for learners with disabilities. Digitalisation in education can benefit learners through a multi-pronged focus on “entry”, “engagement”, and “empowerment”.

➤ Keep both “access to learning” and “learning to access” in mind.

A helpful model is provided by researchers McLindon and colleagues, who argue that investing in a good fit with the users of technology is essential. They highlight how “users” should be understood as active and empowered individuals, and how “learning to access” must go hand in hand with efforts to improve “access to learning”.⁵⁷ To bridge this gap, we need greater investment in affordable assistive technologies, and

in local innovation to ensure availability and easy access to services such as the maintenance of devices.

➤ Take a twin-track approach.

When thinking about children with disabilities, we need to take a twin-track approach, that is, investment in wider technology initialization, and in parallel, investment in the specific needs of learners. A focus on the needs of students also ensures that we continue to ask critical questions, such as where and under what circumstances high-tech solutions can help us address challenges around the right to education, and where on the contrary where there might be much simpler and more affordable solutions.

DESIGNING FOR INCLUSION IN DIGITALISED EDUCATION

Émeline Brulé

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Key takeaways: challenges and opportunities in designing for inclusion in digitalised education

- Invest in teacher-centred development of inclusive technologies and interactive resources, that meet their needs and balance demands for agency and personalisation.
- Prioritise open and interoperable technologies that maximise compatibility and transferability between devices and different software to foster an ecosystem of solutions, rather than reliance on one tool or platform.
- Support local control and maintenance rather than large platforms and companies, that may not reflect local contexts and have few incentives to serve marginalised users.

Designing for inclusion refers to a range of approaches in the development of technology and learning materials. Inclusion as an educational policy is historically associated with mainstream classrooms in which disabled and non-disabled students learn together. Recently, this definition has widened to describe schooling systems that acknowledge and even build upon learners' diversity – be it sensory, physical, cognitive, cultural or linguistic. This is a key motivation underpinning the adoption of technologies in education: the idea that the flexibility of using multiple media and being able to share resources instantaneously might allow personalisation at scale. However, how such technologies and interactive resources can be designed and implemented in the classroom is far more complex.

The Universal Design for Learning (UDL) framework aims to provide an approach to engaging all learners: it includes having access to (1) various ways of supporting learners' engagement and motivation individually and in groups; (2) a range of representations of information across languages and modalities (written, audio, visual); and (3) means by which students can express and organise their own learning.⁵⁸

Despite the utility of these frameworks, it can be difficult to balance personalisation and equity when setting different learning goals for students. For example, developing multiple representations (such as audio and visual content) is time consuming and increases teachers' workloads. As a result, they can be more reliant on existing Big Tech platforms and decrease local adaptations in teaching. Moreover, despite hopes that children's uses of different media (in their everyday lives would make them "digital natives",⁵⁹ students face inequalities in their access to technologies and in the support they receive outside of the classroom to become self-driven students.

When designing technology for the inclusion of disabled children, two approaches coexist. Firstly, adapting mainstream devices such as laptops and tablets through accessibility options. Secondly, the creation of more specialised products for specific groups of learners. Over the years, many specialised products have become mainstream, and this is generally described as more inclusive. One example is the integration of screen readers in smartphones, which used to involve a separate and expensive piece of software, or even a specialised device. Adapting mainstream

devices promises to reduce costs, lessen stigma and even benefit other learners. Moreover, technologies may support the inclusion of more students in mainstream classrooms, for instance through mixed online and offline classrooms. However, some needs might be better met by specialised products, and technologies that are common in classrooms today may still need to be used in ways that make certain students stand out. For instance, children with low vision using enlarged interfaces and texts may still be perceived as different by their peers.

Designing for inclusion using digital technologies therefore requires that we take in to account wider learning environments and infrastructures. This includes carefully considering which technologies to build on, how to maintain them, and the educational values they embody and encourage. For example, many learning technologies privilege tailored individual learning over collaboration.



5 DIGITAL CITIZENS OR CONSUMERS?

The digitalisation of education has the potential to both undermine and enhance links between education, citizenship and civic participation. Sustainable Development Goal (SDG) Target 4.7 asks that states “ensure that all learners acquire the knowledge and skills needed to promote sustainable development”, through global citizenship education. Various forms of citizenship education have been promoted as a way to address this intersection. As Andres Lombana discusses, while many support the capacity of students to engage as active citizens, there is also a risk of top-down, de-contextualized approaches that fail to address inequalities.

For some, a central promise of digital technology is that it might support students, teachers and schools in developing a more critical and democratically oriented education.

In her contribution, Jennifer Forestal outlines the principles underlying this potential – one often at odds with the incentives introduced by the ownership of digital platforms by Big Tech. As Yusuf Sayed highlights, the possibility for democratising uses of technology are dependent on the fostering of digital literacies, as well as more supportive policy and regulatory environments. From this perspective, and as Jesse Stommel explores in his overview of Critical Digital Pedagogy, the potential for digital education to strengthen civic ties, participation and social justice – against significant counter-trends – rests on the ability of educators, policy makers and practitioners to answer challenging questions about citizenship and the forms of pedagogy, interaction and relationality that education involves.

READING AND RESOURCES

- Jennifer Forestal recommends *The Internet and Engaged Citizenship* by David Karf, available online as part of the Commission on the Practice of Democratic Citizenship project.
- Andres Lombana recommends the article *Digital inequalities 2.0: Legacy inequalities in the information age* published by Robinson and colleagues in 2020 on First Monday.
- Yusuf Sayed shares *Ground Down by Growth: Tribe, Caste, Class and Inequality in 21st Century India* a book by Alpa Shah and colleagues, published by Pluto Press in 2017.
- Jesse Stommel recommends *Critical Digital Pedagogy: a Collection*, the first peer-reviewed publication centered on the theory and practice of critical digital pedagogy.



CRITICAL DIGITAL LITERACY AND CITIZENSHIP EDUCATION

Yusuf Sayed

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Key takeaways: supporting critical digital literacy, citizenship education and democracy

- Critical digital literacy is a crucial link between the use of digital technologies and the potential to pursue social justice and democracy in and through education.
- A precondition for developing critical digital literacy amongst students is ensuring equity of access for all.
- Critical digital literacy is a social literacy, which requires relational pedagogic approaches.
- This must be supported by enabling and clear policy frameworks and governance.

In the context of the COVID-19 pandemic, ideas about the potential of technology in education have re-surfaced, and the flipped classroom, hybrid and blended learning, have been represented as the vital modalities of education, in and for the future. This vision has accompanied an expanding role for large education companies and the intensification of educational corporatization. Using the concept of “critical digital literacy”, I explore two questions: 1) What are the potentials and pitfalls of technologies in education for realising rights and democracy? And 2), under what conditions might the potential for ensuring equitable and quality education for all be realised?

Target 4.7 of Sustainable Development Goal 4 states that education is more than just content learning in maths, languages and sciences.⁶⁰ The target commits national governments to realising the goal of living together and learning to be.⁶¹ Against this backdrop, digital education has wide potential scope. Although it is often assumed that by “technologies” we mean computers, in many developing country contexts important technologies include radio, printed material and television. Digital education involves leveraging all technologies for quality teaching and learning.

There is a complex relationship between digital technologies and citizenship education. Past work has highlighted that critical digital literacy is crucial to building social justice and democracy in and through education.⁶² Learners need specific knowledge, skills and dispositions to exercise citizenship competence through digital education. Critical digital literacy intends, at its core, to provide learners with the skills to access, use, evaluate, apply, and transform information from appropriate technologies in ways which advance democracy.

This is a key potential offered by digital technologies, and it is an inherently social one. Critical digital literacies might enable young people to participate in civic society, forming the basis for informed, active, and vibrant communities and societies. It might also support young people to comprehend issues of privacy, be mindful of protecting their own and other’s digital wellbeing, and display empathy and sound judgment in their use of technology and information. To assess this potential for digital technologies to enhance citizenship education, we need to address what online or blended learning means in relation to the social nature of learning and pedagogy. Critical

questions include: how do we teach and model democracy and citizenship in online or hybrid modes, without face-to-face interaction?

Alongside this potential, there is much to make us cautious about the role of technologies in education and their implications for realising rights and democracy. As the contribution from Janet Kwami (Theme 4) in this collection highlights, deep and worrying inequalities in access persist. In addition, online learning has granted education technology companies growing control of education content, process and product, with myriad consequences (see the Datafication and Privatisation themes in this collection). To protect and support learners’ capacities for critical digital literacy we need to ensure that teachers and governments retain their key role in developing online learning content. In order to support the agency of students and teachers to leverage technologies for progressive forms of education development, we also need enabling, empowering and equitable education systems.



Supporting critical digital literacy, citizenship education and democracy

- Critical digital literacy is a crucial link between the use of digital technologies and the potential to pursue social justice and democracy in and through education.
- A precondition for developing critical digital literacy amongst students is ensuring equity of access for all. This requires effective policy and financial investment on the part of national governments to guarantee basic infrastructure, aligned with a strong commitment to overcome historical and structural barriers to technology access.
- Critical digital literacy is a social literacy, which requires relational pedagogic approaches. It should form part of curricula and content which are broad and deep; relevant, contextually specific and localised; be developed in consultation with teachers; and integrate appropriate forms of assessment.
- This must be supported by a policy framework which leverages but regulates private non-state actors; which adheres to a clear framework for data usage; which protects the privacy and safety of children and all users; and which is adequately financed.

Figure 9

Critical digital literacy in education: an equity-focused social justice approach



Source: Sayed (2021).

DIGITAL TECHNOLOGIES, CITIZENSHIP AND DIGITAL DIVIDES

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Key takeaways: civic participation and digital education in unequal societies

- The relationship between citizenship, participation and digital education shapes how young people are able to exercise their rights and responsibilities in a rapidly changing world.
- A key challenge for digital education and participation are digital inequalities. Digital transformation reproduces and amplifies existing structural inequalities.
- Education initiatives and programmes must be designed to prioritise equity and inclusion and be oriented towards multi-sector coalition building and multi-stakeholder collaborations.

The concept of digital citizenship has become central in discussions about youth, education, and learning. For many stakeholders – in education, government and elsewhere – “digital citizenship” has become a way of talking about how young people might address the challenges and opportunities that digital environments present. Digital technologies have opened up new ways for young people to participate, create and innovate. Digital “civic participation” refers to the multiple ways that young people can use digital technologies to engage meaningfully with the cultural, political, economic and civic worlds around them. In education contexts, initiatives have aimed at fostering different visions of digital citizenship and participation, in the classroom and beyond.⁶³

Increasingly, educators and researchers are recognising that the relationship between citizenship and digital education is complex, dynamic and interdependent. Rather than being a matter of “skills” alone, it encompasses many dimensions of life in contemporary democratic societies. Education is central to young people becoming active and critical citizens; digital education is central to the development of the multiple skills and dispositions needed to live in

a rapidly changing digital world. Furthermore, education is critical for citizenship formation and supporting people’s exercise of their rights and responsibilities as citizens.

Recognising this, education for digital citizenship and participation needs to be diverse, plural and adaptable to particular contexts and realities. Because digital citizenship and participation focuses on what connects young people with civic opportunities, it demands educational initiatives that are hybrid. That is, which combine formal and informal learning, connect different contexts (such as the school, home, peers and community), and foster an ecology of actors, institutions and resources.⁶⁴

A key challenge in addressing the interconnections between digital education and participation are digital inequalities. Digital inequalities have a direct impact on people’s life chances, collective wellbeing and citizenship. Although inequalities in civic participation have long been a critical issue, the process of digital transformation has made them more complex and difficult to solve. Digitalisation has not only contributed to the emergence of multiple digital gaps (for example in access to technology, skills

acquisition and usage outcomes), but has also amplified and reproduced structural social disparities. For civic participation, this means that although there are now more chances to exercise agency and rights through the use of technology, those opportunities are unevenly distributed.

Research has demonstrated that many “digital gaps” exist between population groups and vary across local, national and regional contexts. Digital disparities exist, for example, in relation to the skills (literacies), the uses (such as consumption, production, programming), and the benefits that people gain from their digital practices (such as income, learning, cultural and social capital). This has direct implications for citizenship because it intensifies differentiation and stratification among people, amplifying the exclusion of certain population groups that have been historically marginalized. The impacts of these widening inequities are very tangible: those who lack access to technology, skills development and resources tend to use digital tools mainly for entertainment consumption and basic social communication, but rarely engage in online activities that allow them to fully participate across multiple civic dimensions.



Confronting these issues demands collaboration among public and private sectors and a focus on the intersection of citizenship, equity, and education. To embed opportunities for civic participation in digital education, we need to prioritize equitable access to learning, civic and career opportunities, and the inclusion of all citizens. Furthermore, formal and informal education initiatives must recognize the diversity and plurality of learners, and be designed to take into account the particular conditions and disparities that characterize specific contexts. By embracing equity and inclusion, digital education can contribute to fostering the participation of all citizens.

Summary: civic participation and digital education in unequal societies

- Increasingly, there is recognition that the relationship between citizenship, participation and digital education is complex and evolves in parallel to social and technological changes. This relationship shapes how young people become active and critical citizens and how they are able to exercise their rights and responsibilities in a rapidly changing world.
 - A key challenge for digital education and participation are digital inequalities. Digital inequalities are multiple, interact with each other in complex ways, and continue to evolve. Digital transformation reproduces and amplifies existing structural inequalities in income, education, health and gender.
 - Drawing on what we know from research, education initiatives and programmes must be designed to prioritise equity and inclusion and be oriented towards multi-sector coalition building and multi-stakeholder collaborations. They should aim to foster connections across contexts (such as the school and community) and between an ecology of actors and institutions.
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AN INTRODUCTION TO CRITICAL DIGITAL PEDAGOGY

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Key takeaways: what can education decision makers learn from Critical Digital Pedagogy?

- Critical Digital Pedagogy helps us understand education systems more holistically.
- Critical Digital Pedagogy reminds us to take time to deeply understand the material, social, and political circumstances of students.
- Critical pedagogies rely on supportive infrastructures.
- Critical Digital Pedagogy helps us examine tacit assumptions about how humans learn and what teachers and institutions can do to differently to better support that learning.

Critical pedagogy asks that we consider the specific idiosyncratic experiences of students and teachers before imagining that there are simple solutions to issues of equity and access in education. The cost of education and other geographical, social, and political barriers inhibit broad and diverse engagement. We know, for example, that already marginalized students are more likely to face significant barriers. There are both policy and pedagogical responses to this problem.

Before we talk about curriculum, content, or assessment design, we have to start with a consideration of basic needs, asking whether our students had breakfast that morning or if our teachers are being paid a living wage. This becomes especially critical as more of our work moves online, which often results in students and teachers being separated from necessary supports. Digital education, offering educational opportunities in more and new modalities, can increase access (and remove barriers), but only if we critically interrogate our technologies, digital pedagogies, and engage more thoughtfully with students.

Critical Pedagogy is focused on helping students become “readers of their world,” in the

words of Paulo Freire, able to critically interpret their material and political circumstances in order to make effective change.⁶⁶ This puts education right at the heart of questions of citizenship. Critical Digital Pedagogy asks how and to what extent students can be full agents in their education when it is mediated in digital space. For example, can reflective dialogue flourish within web-based tools, social media platforms, or learning management systems? Can we build platforms that support learning across age, race, culture, gender, ability, geography? What are the specific affordances and limitations of technology toward these ends?

Consider a technology like the learning management system (or virtual learning environment), which has become nearly ubiquitous in some countries and is seeing growth around the globe. As of 2015, Educause reported that 99% of institutions in the U.S. had adopted a learning management system.⁶⁷ According to *Business Wire*, the global learning management system market is expected to grow from 13 billion in 2021 to 31 billion by 2027. What pedagogies are at the foundation of these systems? How does the structure of these systems influence how teachers engage

with students and how students engage with one another? Many of these systems have an architecture that is structured around a grade book, reducing students to rows in a spreadsheet and their work to columns. How does centring grades and instrumentalising student work change the nature of our work in education? These are the kinds of questions at the heart of Critical Digital Pedagogy.

What can education decision makers learn from Critical Digital Pedagogy?

- Critical Digital Pedagogy helps us understand education systems more holistically. For example, education decision makers need to consider ways to invest in faculty preparation and support, not just new technologies. This can be done by creating new funding programs and grant initiatives that encourage pedagogical research and educational outreach, and also by committing to a permanent, non-contingent academic workforce.
- Critical Digital Pedagogy reminds us to take time to deeply understand



the material, social, and political circumstances of students. This requires continuing research to create a fuller picture of students and their material circumstances.

➤ Critical pedagogies rely on supportive infrastructures. To support broad engagement, we need digital infrastructure that mirrors the social and community supports students find at bricks and mortar institutions: advising, teaching and learning centres, emergency aid, disability resource centres, offices of diversity, etc.

➤ Critical Digital Pedagogy helps us examine tacit assumptions about how humans learn and what teachers and institutions can do to differently to better support that learning. For example, it offers ways we might re-imagine assessment, moving away from standardized, quantitative approaches and toward flexible practices designed for equity.⁶⁸

DIGITAL EDUCATION FOR DEMOCRACY

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Educating for citizenship involves restructuring the classroom and curriculum in ways that democratize the *process* of learning. Digital technologies have the potential to support this work—but they are also increasingly being used in ways that thwart this goal.

Democracy is perhaps best understood as a *set of practices*: it involves citizens' active participation in collective decision-making. It demands treating co-citizens with respect, reciprocity, and accommodation. It requires ties of solidarity and mutual obligation between citizens. And while we often think of educating citizens as a matter of substance — ensuring that every student has access to a formal curriculum that includes some amount of civic knowledge — this access is necessary, but insufficient. Because democratic citizenship is fundamentally a way of living, the way we teach students matters for whether they ultimately cultivate and embody democratic practices.

Democracy involves *working with others*; it is a collaborative and inclusive enterprise. As tools that help users gather and communicate with one another more effectively, digital technologies hold significant promise for the possibilities of democratic education. But, too often, digital technologies are used to undermine this goal. Often, for example, people who use technologies

are locked out of the processes of decision-making about technology. This kind of disempowerment is what the political theorist Iris Marion Young calls *domination*: Insofar as people—whether citizens or social media users—are prevented from being part of the decisions that shape their actions, they are being dominated.⁶⁵ Instead, justice requires that we create “seats at the table” for all the constituencies who are affected by decisions.

Yet digital technologies can exacerbate this injustice. We often see technologies designed for goals — like data collection, surveillance, profit, etc.— that end up alienating and isolating users from one another and entrenching individualist perspectives; they fail to facilitate our ability to make decisions collectively and equitably.

So, when we think of investing in digital technologies to support democratic education, we should focus our efforts on building technologies and crafting policies that *bring us together* with others and facilitate work on our common goals.

Principles to guide digital education for democracy

- Empower stakeholders to participate in decisions about technology design and deployment. Importantly, this kind of inclusion must not be reduced to “token”

representation. Instead, empowered participation means that we design decision-making structures to provide effective voice and vote for all involved.

- Invest in collaborative technologies as digital public infrastructure. In order to support democratic education, we need to build digital environments that will support *public* or *social* aims and ends, even if those technologies are privately owned.
- Prioritize transparency and accountability around the design of digital technologies. This might mean, for one, imposing regulations around the information we can access—such as information about data collection practices and algorithmic rules. But it also means creating more digital environments that are open to being altered by those that use them: supporting more open-source software, where users can take an active role in their development.

Ultimately, our goal should be to build digital technologies that train citizens in sourcing, curating, and sharing information, that facilitate the collaboration that grounds democratic politics, and that empower citizens to participate in decision making as full and equal members of their communities.

Key takeaways: principles to guide digital education for democracy

- Empower stakeholders to participate in decisions about technology design and deployment.
- Invest in collaborative technologies as digital public infrastructure.
- Prioritize transparency and accountability around the design of digital technologies.

6 THE HEALTH IMPACTS OF DIGITALISATION

Experts in health and in education are agreed that digitalisation poses very real risks to the physical and mental health and wellbeing of learners. These risks are multiple and, in many cases, interlinked. Despite damaging health impacts already being faced by children and young people, policy and research has yet to effectively address this challenge. Here, authors reflect both on what we know from research, and the gaps in current knowledge to guide policy and decision making.

Serge Tisseron outlines guidelines on the use of screens and how to promote safer uses of technologies for children. Cristiano Nabuco discusses the nature of health risks, with a particular focus on childhood development. And in the closing contribution, we describe a research gap at the intersection of health, education and digital technologies, outlining some indications for a future – and urgently needed – research agenda.

READING AND RESOURCES

- Cristiano Nabuco de Abreu recommends the World Health Organization's *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age* published in 2019. He also recommends the 2016 policy paper *Media and Young Minds*, published by the Council on Communications and Media.
- Serge Tisseron suggests visiting the www.3-6-9-12+.org website for further guidance on the ideas outlined in his contribution.



SCREEN TIME AND CHILDHOOD DEVELOPMENT

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Key takeaways: screen time and childhood development

- The use of digital screens may cause damaging effects to children's and adolescents' physical and mental health, where this use is not actively shaped and monitored.
- Research studies indicate that excessive use favours the emergence of harmful effects on the cognitive and language development, as well as on the development of motor skills.
- Unattended access to digital screens is not advised.
- Education decision makers are advised to invest in research and programming that investigates and evaluates the consequences of screen time children's health, and provide cautious and proactive guidance and regulation.

Most readers of this publication will be familiar with the idea that excessive screen time can be harmful to health and wellbeing. However, studies have shown that when it comes to children, the potential for damage may be huge. Multiple studies have linked prolonged screen time with an increased risk of obesity, attention deficit and hyperactivity, sleep problems, unsatisfactory academic performance, and unhappiness, as well as poor early cognitive and motor development outcomes for children and young people.⁶⁹

In 2015, a prospective cohort study showed lower cognitive and language development in children as young as 6 to 14 months old who were exposed to electronic media. Sixty minutes of screen-based media exposure per day was enough for toddlers to have lower scores than their non-exposed peers,⁷⁰ while another study showed developmental delay in young children with frequent television exposure.⁷¹

Excessive screen time also impacts children's behaviour. Pre-schoolers between the ages of 2 and 6 years showed behavioural difficulties in a 2018 study: those who used mobile phones were three times more likely to develop characteristics of hyperactivity or

inattentiveness than non-users.⁷² In addition, a large long-term cohort study of more than 16,000 2- to 9-year-old children demonstrated that each additional hour of screen time resulted in 1.2- to 2-fold increased probability of emotional problems and poorer family functioning,⁷³ while another study that evaluated more than 3,000 children at 3 years old in the US reported that children who had greater exposure to television were more likely to exhibit violent behaviour.⁷⁴

We already have enough data to say that excessive screen time is now an undeniable public health concern and that our children's social skills and emotional wellbeing are at stake. There are also many factors still unknown (see the final contribution in this theme on much needed investment in research in this area).

Together with nutrition and physical wellbeing, parents, professionals, and policy makers must be attentive to digital stress as a key factor affecting children's safety and mental health. The first years of life are key to human development; and nourishing our children with good digital stimuli is critical to protecting their futures (on this, see the contribution from Serge Tisseron).⁷⁵

“*There can be no equality of opportunity without appropriate stimulation, nurturing, and nutrition for infants and young children. Conditions of poverty, toxic stress and conflict will have produced such damage that they may never be able to make the best of any future opportunities. If your brain won't let you learn and adapt in a fast-changing world, you won't prosper and, neither will society.*”⁷⁶

World Bank Group President
Jim Yong Kim, Oct 1, 2015

GUIDANCE ON THE USE OF TECHNOLOGY FOR CHILDREN AND YOUNG PEOPLE

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Key takeaways: the 3-6-9-12+ guidelines

- A good digital education environment is based on three general principles. Variation, guidance and teaching self-regulation.
- These principles can be applied differently at each age: these are the 3-6-9-12+ guidelines.

A good digital education environment is based on three general principles. *Variation*, which consists of encouraging a diversity of activities, with and without screens, and by privileging creation over consumption alone. *Guidance*, which involves talking with children about what they see on screens and what they do with them. And finally, *teaching self-regulation*, in particular by identifying screen time and encouraging children to associate their screen use with a limited duration of time.

These principles can be applied differently at each age: these are the 3-6-9-12+ guidelines.⁷⁷

Before age 3: Never leave a small child in front of a screen or in a room where a screen is on. This does not prevent you from playing from time to time with the child using a fun app. This may obviously be done for a short period of time – in addition to traditional games – and always accompanying them.

From 3 to 6 years old: Screens must be in a common room and limited to 30 minutes at 3 years old to one hour maximum per day at 6 years old. Digital tools should be family-

oriented. It is also important to set a daily time slot for the child in order to get them used to associating screens with a limited duration of use. Try not to use digital tools during meals, to calm children or to reward them. Finally, remember to encourage physical activities and all manual creativity, such as folding, cutting, gluing, cooking, crafts, etc.

From 6 to 9 years old: Invite children to create with screens. For example, using digital photography, Scratch (an easy programming language to create stories, animations, games, etc.) or Stop Motion software (to make movies, for example), etc.⁷⁸ Also start talking with children about the age when they will have their first mobile phone and set rules that forbid these phones at certain times, for example during family meals and in the bedroom at night. Buy everyone an alarm clock!

From 9 to 12 years old: Encourage children to manage their screen time by using a “screen time log”. Talk to them about what they see and do with screens. And explain the three rules of the internet: 1) anything you put on it is entering

the public domain, 2) everything you put on it will stay there forever, and 3) you shouldn’t necessarily believe everything you find on it.

After age 12: Several studies show that it is generally beneficial for teenagers to use social networks. As a precaution, however, parents are advised to delay buying their child a mobile phone as long as possible, and to select a device with limited functions – such as a flip phone with no internet or touch screen – and to install an application that limits the time they can spend on it. And, set a good example: use technology devices purposefully, for specific activities, not out of boredom; and never eat in front of a screen!

THE HEALTH IMPACTS OF DIGITALISATION: AN URGENT RESEARCH AGENDA?

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In June 2021, a group of experts met with the United Nations Special Rapporteur on the Right to Education and NORRAG to discuss the health impacts of the digitalisation of education. The consultation brought together expertise on psychology and psychiatry, paediatrics, and the cognitive and social sciences. We aimed to identify what key learning, across the respective fields of research, would constitute the most useful and pressing for international education policy.

The task was a challenging one. Despite some overlaps in expertise, there were many gaps

in what the group could collectively identify and agree on. Our conversation made plain the existence of a significant research gap at the intersection of digital technology, health, and education. While we have, for example, knowledge about the impact of screens on children's health, this relates largely to recreational use rather than educational screen time.⁷⁹ Equally, research within education that addresses health concerns has largely neglected the digital aspects of learning.

This area is inherently complex for both research and policy making. Multiple factors affect how digital technologies interact with health in and through education. These factors include which digital technologies are used and how, the kinds of content involved, and the interactions that take place between online and offline learning. This raises many pedagogical questions as well as those about education systems and the integration of digital technologies. This set of issues then interacts with wider social ones, including the home and community context, and wider social and cultural dynamics within which learners are

embedded. Of course, every child is unique, and each will experience and respond differently to exposure to digital technologies. The impacts and the risks they pose are also different at different stages of a child's or young person's life (see contributions from Guillaume Dumas and Serge Tisseron). Where existing literature takes a monolithic approach (addressing all students, in all classrooms), we must advance a more nuanced and contextually sensitive approach, that attends to the individual, in the context of their classroom, school, home and community.

This agenda is demanded because the potential impacts of digital technologies on human health are significant. They encompass risks to mental and physical health and to development. In each of these areas, risks have been identified in research and it is likely that many children and young people are already living with the consequences. For example, in the area of physical health, we know there are clear links between screen use and obesity⁸⁰. In the area of mental health, we know that excessive screen time is linked to loneliness and depression, as well as changes in motivation.⁸¹

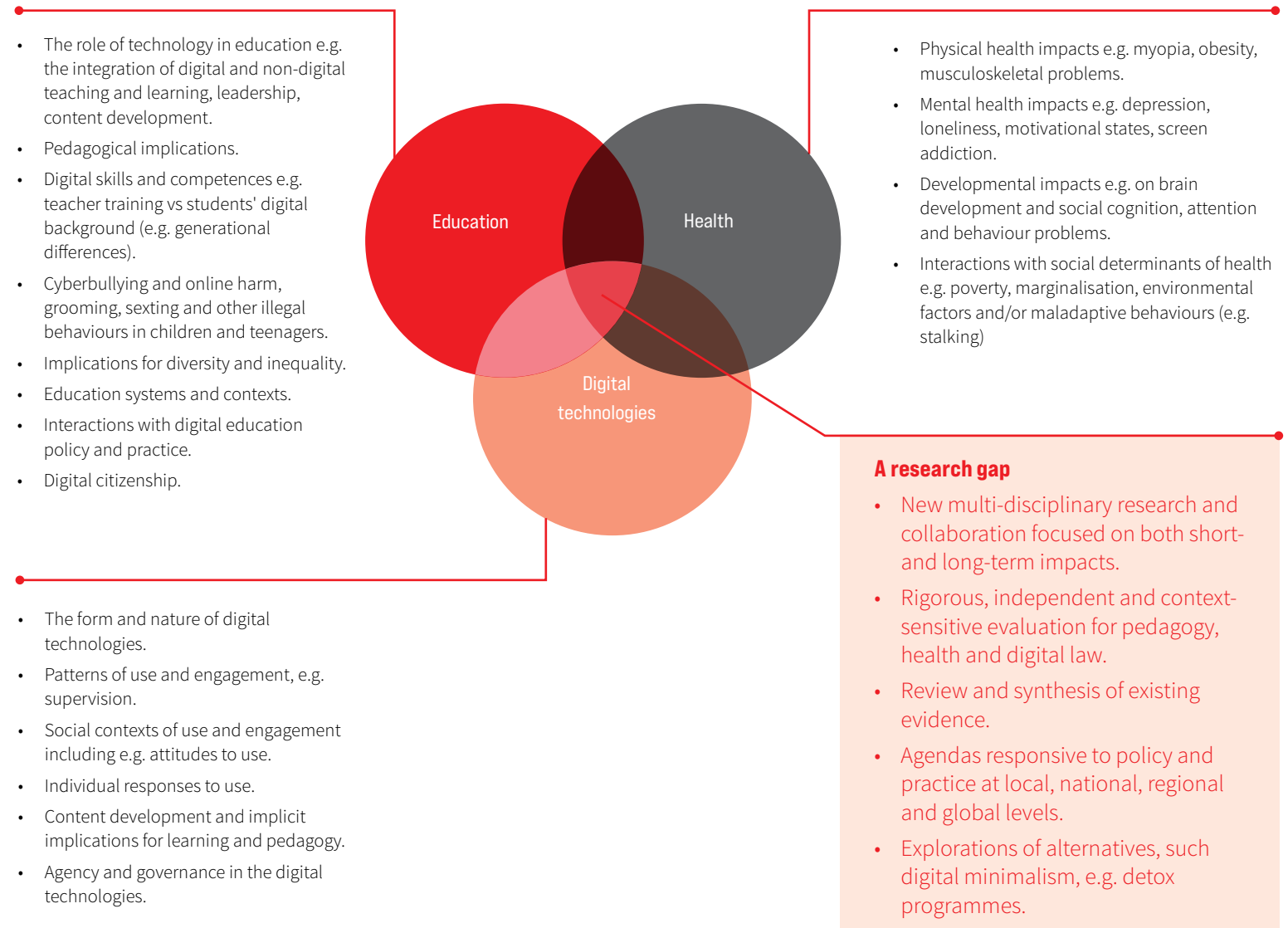
Key takeaways for implementing research agenda

- Requires a transdisciplinary approach, which demands collaboration across disciplines.
- Undertake more rigorous review, synthesis and evaluation of existing uses of technology.
- Make real and long term investment in new interdisciplinary research.
- Include research and researchers who are often overlooked and under-represented in debates about the role of digital technologies in education.
- Work with policy makers and civil society to find solutions for healthier, more just, and more sustainable, educational futures.

Developmentally, there are clear concerns that digital learning systems may induce biases and issues in core developmental processes (see the contribution from Cristiano Nabuco de Abreu).⁸² In what ways are these impacts already at play in education and in young people's lives around the world? And how do they affect the right of every child to a safe education?

Figure 10

A multidisciplinary perspective on the health impacts of digital technology use in education: indications for future research



THEME ONE
THE ROLE OF TECHNOLOGY IN EDUCATION

THEME TWO
DATA, DATAFICATION AND SURVEILLANCE

THEME THREE
PRIVATISATION AND THE DIGITALISATION OF EDUCATION

THEME FOUR
DIVERSITY, DIGITAL DIVIDES AND DIGITAL EDUCATION

THEME FIVE
DIGITAL CITIZENS OR CONSUMERS?

THEME SIX
THE HEALTH IMPACTS OF DIGITALISATION

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Contributing organisations

The **Inter-agency Network for Education in Emergencies (INEE)** is an open, global network of members working together within a humanitarian and development framework to ensure that all individuals have the right to a quality, safe, relevant, and equitable education. INEE's work is founded on the fundamental right to education.

The **European Council for Steiner Waldorf Education (ECSWE)** is an association of Steiner and Waldorf schools in Europe that represents more than 775 schools in 28 countries. Founded in 1991, its vision is education that enables all children to holistically unfold their unique potential throughout their life-long personal and professional development. See more here: <https://ecswe.eu>.

Maiam nayri Wingara - the Australian Indigenous Data Sovereignty Collective was formed in early 2017 and aims to progress Indigenous Data Sovereignty and Indigenous Data Governance in Australia. The Collective can be found online at www.maiamnayriwingara.org/.

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