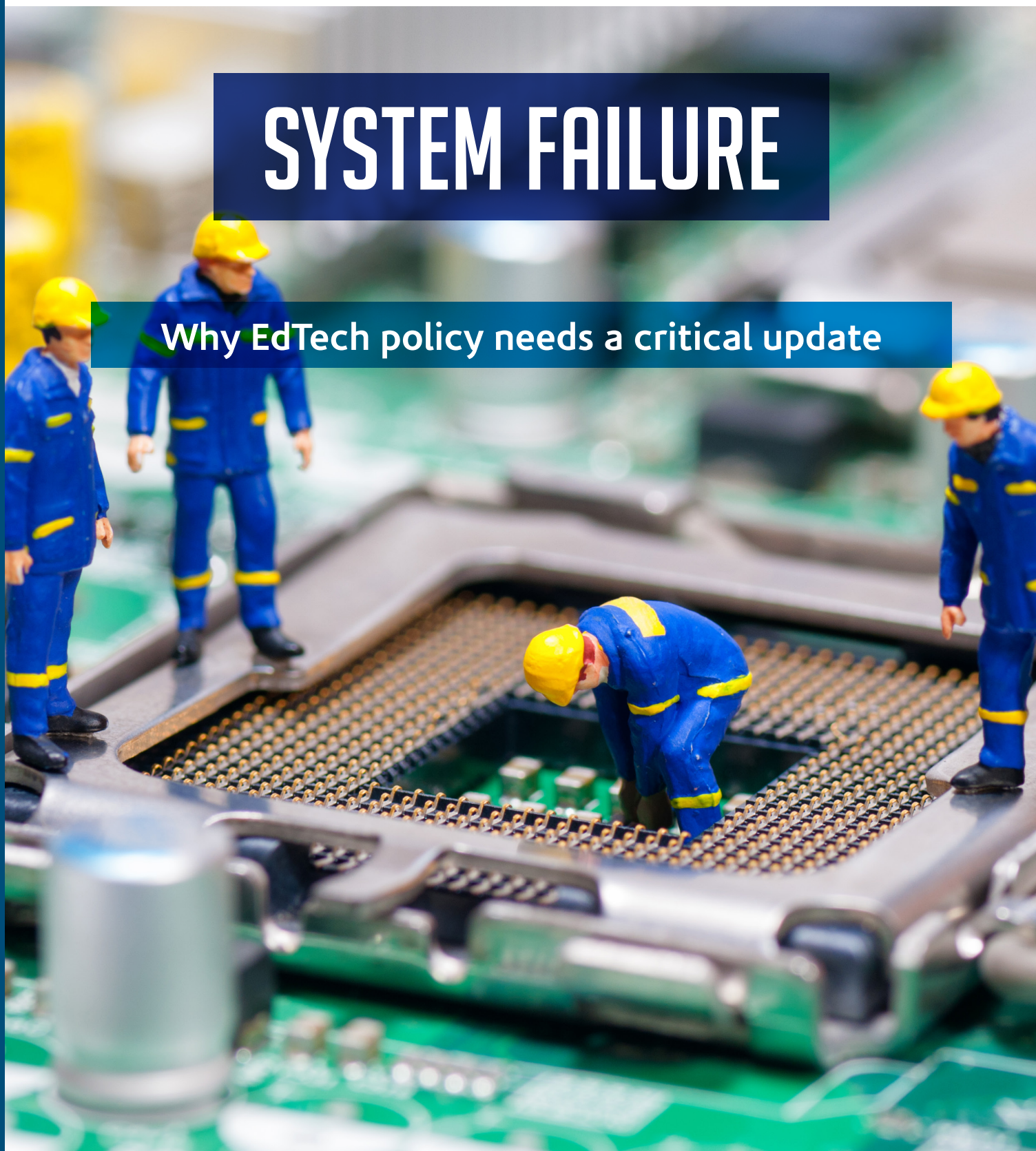


SYSTEM FAILURE

Why EdTech policy needs a critical update





**“ EDTECH IS AN
UNCHARTED FRONTIER
FOR POLICYMAKERS,
BUT IT DOESN'T HAVE
TO BE THE WILD WEST. ”**

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About the Varkey Foundation

The Varkey Foundation is a not-for-profit organization established to improve the standards of education for underprivileged children throughout the world. Our mission is to build the status of teachers and to celebrate their profession.

The Varkey Foundation is a charity registered with the Charity Commission for England and Wales under charity number 1145119 and a company limited by guarantee registered in England and Wales under company number 07774287.

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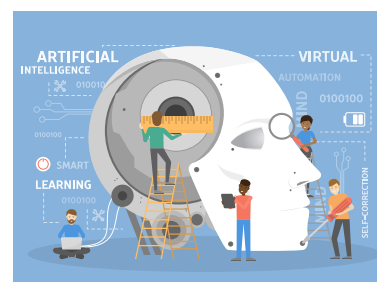
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Forward

Fifty years of policy stalling on EdTech

By Vikas Pota, Chair of the Board of Directors of the Varkey Foundation and Group Chief Executive of Tmrw Digital.

IT'S NO easy job to predict the future. But half a century ago, the Foreign Policy Association asked a group of experts to try anyway. The results were published in a 1968 book called "Toward the Year 2018". One chapter is by Anthony G. Oettinger, a renowned Harvard professor of applied mathematics and computing pioneer who advised the Apollo programme. It's entitled "Educational Technology."

Much of what Professor Oettinger thought EdTech would look like in 2018 is eerily prescient. Over 50 years ago, he imagined a world in which technology would give anyone, anywhere "...ready access to libraries and their books, [and] to videotape or film libraries containing lessons on specialized topics". By 2018, he thought, teachers would also have a variety of educational technology tools, to be used variously for "dictionaries, thesauri, currency-conversion tables, war games, peace games, and the like." He wondered broadly whether educational technology would allow "under-developed countries" to take a shortcut through "the rocky Western road to literacy and universal education."

Policy-makers of the time shared the optimism. In 1964, US President Lyndon Johnson predicted that technology would advance teaching more in 10 years than all of the progress made in the 19th Century. It would also, he promised solemnly, "open new horizons for young people, to equip them for the opportunities and the responsibilities of their time."

Professor Oettinger was confident that education would look very different in 50 years' time. But he also knew that system change happens slowly. Ten years from 1968, he predicted, education would still continue "pretty much" the same. Professor Oettinger helped to put a person on the moon, and wrote his first published paper on artificial intelligence. But he was still wrong. In 2019, education still continues throughout much of the world pretty much the same as it did back in 1968.

There's no question that today's technology is incredibly powerful. We now carry around more number-crunching power in our smartphones than the computers that drove the Moon landing. But the classroom of 2019 still looks very similar to that of 1968. The pencil is still, by some margin, the most ubiquitous piece of technology in a school. A good teacher is still its most irreplaceable resource.

And learning technologies are still an afterthought. Today, just a handful of the world's governments have anything resembling a working EdTech policy. Examples of best-practice are few and far between. The political narrative about technology in education is worryingly similar to that of 50 years ago. Real change, we are told, is always just 10 years away.

important part of the puzzle.

It's no secret that education policymaking struggles to keep up with the pace of technology. But it shouldn't stand still. EdTech aside, the experts who in the 1960s and 1970s imagined that digital technology would change the world have been definitively proven right – although few realistically imagined that artificial intelligence would have such an impact on business and industry. Around the world, major industries and business have now spent decades preparing for a future that they know will be dominated by tech.

Ministers of education desperately need to start doing the same. The answer won't be found just by putting more computers in classrooms. Instead, ministers need to address the political obstacles that too



Our world does not have another 10 years to get it right. The last half century has delivered unprecedented access to education for children around the world. But this global progress has not delivered quality of education. Today, over 617 million children and young people are not achieving the minimum proficiencies in reading or mathematics, according to the UN's education agency, UNESCO. Over 263 million more are out-of-school. Educational technology may not be the whole solution to this global learning crisis. But it is an

often prevent EdTech from succeeding. Rather than pushing more tech on teachers, policymakers need to focus on the educational changes they want to see in the classroom, and think carefully about how learning technologies can deliver them.

Fifty years ago, our world believed that technology could transform education for the better. It's time to make good on that belief.

Executive Summary

TODAY, THERE are more computers in schools than ever before. For decades, governments around the world have invested in ICT and EdTech. However, there is still little to no evidence that learning technologies have had a positive impact on learning outcomes at the national level. As a sector, EdTech is still struggling to make its mark on education systems. However, experts who spoke to the Atlantis Group for this report can also point to success stories in classrooms around the world.

The obstacles to learning technologies' success at a system level are political as well as technological. Experts who spoke to the Atlantis Group identified a range of systemic issues. There is little independent evidence about which EdTech products improve learning outcomes, so popular but ineffective products stay on the market. Procurement processes are heavily fragmented, so effective technology doesn't scale. Poor infrastructure in low and middle-income countries means that many schools don't have functional access to electricity, let alone the internet. And teachers are often under-equipped to use learning technologies. The answers to these issues won't come from more tech. They will come from more effective policymaking.

So far, policymakers have used EdTech to retrofit traditional education systems. It could do so much more. Today's EdTech can't replace teachers, but it can augment good teaching. It can provide teachers and students with a wide diversity of resources that open new perspectives, illustrate concepts in new ways, and help to assess learning. It can help teachers to be more creative and innovative in their pedagogy. It can help to inform their decisions in the classroom, as well as to learn from their peers. It can help make education more accessible to disadvantaged learners. Learning tech is an important toolkit that every teacher should be able to use. But to do that, learning technologies themselves must be at the centre of education – not the periphery.

EdTech is also advancing quickly – and far beyond what today's limited policy frameworks can adequately manage. The next generation of EdTech won't replace teachers. But it will be able to shoulder the burden of many of their administrative

tasks, and give them far more time to engage with their students. New personalization technology, for example, may help learners across a system to keep up with the curriculum. Big data from learning technologies may inform decision-making about education at a national level.

The future will also bring new challenges. As learning technologies advance, policymakers will also need to grapple with fundamental ethical questions. Ministers will need to increasingly think about the role of artificial intelligence in education. They will also need to take action to protect learners' privacy in a world which relies on the systematic collection of personal data.

Education ministers should recognize that a piecemeal approach to EdTech is no longer adequate. Our global society is already being rewritten by technology. Unless policymakers work to harness its power, tech will be an increasingly disruptive force in education. From smartphones in the classroom, to learning apps outside of it, learners will be increasingly distracted by the technology around them. The answer is to integrate learning technologies into education systems, rather than to retrofit education systems around them.

To start with, ministers of education need to have a clear view of the changes they want tech to drive in the classroom. They

can then take action across four key areas. They should prioritize evidence-gathering about EdTech, by setting up testbed schools and by keeping themselves updated about other initiatives across the world. They should support teachers, by listening to their needs and training them adequately to use learning technologies. They should make sure that the right products are reaching the market, by publishing clear purchasing guidelines. And they should make learning technologies part of their wider education strategy, by setting up a cross-sector EdTech task force.

These steps would help governments to demolish the political obstacles to effective EdTech. They would build the capacity of teachers to use learning technologies. They would also help to build communities around EdTech of educators, businesses and civil society. These ecosystems, in turn, would help to generate evidence about what works, and to scale effective tech across the education system.

Governments should also recognize that the ultimate obstacle to EdTech's success is the educational system itself. To make EdTech work, education systems need to accommodate a fundamental shift toward data-driven learning. Such a shift cannot happen overnight. But there are incremental steps that today's ministers can take to put their systems on the path.



Methodology

THIS BRIEFING is based principally on a meeting of the Atlantis Group that was held on 22 March 2019 at the Global Education & Skills Forum in Dubai, UAE. The meeting was held in committee and attended by 15 members, all former national and regional ministers of education or heads of government.

Over the course of the day, the Atlantis Group committee sat to hear testimony about educational technology from 16 expert witnesses selected by the Varkey Foundation and the Tmrw Institute. Lists of the witnesses and Atlantis Group members are available at the end of this briefing. Their statements are unattributed.


The Atlantis Group hearing covered a range of aspects of educational technology, including its use in schools today, the key trends for such technology, the challenges faced by schools in adopting learning technologies, and how they may contribute to social good.

The group's findings are set out here in two separate sections. The first explores the political obstacles to EdTech succeeding today. The second examines the trends for the future of educational technology.

The Atlantis Group extends its gratitude to all of the expert witnesses who contributed testimony and gave evidence to the committee.

The Atlantis Group is a body of 26 former ministers of education and heads of government from around the world. Its members have over 85 years of combined experience in managing public education systems. The group advocates for action by the international community to address global issues in education and also puts its expertise and experience at the disposal of governments. The Atlantis Group was established by the Varkey Foundation, a global education charity, and launched at the 2017 Global Education & Skills Forum at the Atlantis The Palm hotel in Dubai, UAE.



A photograph of three children in a classroom setting. A young girl in the center, wearing a pink cardigan, is smiling and looking at a laptop screen. To her left, a boy is looking at the same screen. To her right, another boy is partially visible, also looking at the laptop. The laptop is open on a desk, and there are some colorful objects on the desk in the foreground. The background is slightly blurred, showing other students and classroom elements.

“TECH HAS CAPTURED OUR
IMAGINATION FOR OVER 100
YEARS. SO WHY IS IT
SO DIFFICULT?”

1. EdTech today

When it comes to tech, education systems need an operating manual

BUSINESS IS booming. By 2020, the global market for educational technology will be worth upwards of \$250 billion according to the organizers of EdTechXGlobal, a major technology summit. Half of all EdTech revenue is still concentrated in the US, but mobile phones are also driving growth in traditionally offline education systems.¹ By all rights, ICT should be poised to transform education, the same way that it has almost every other aspect of our global society.

So why has tech had such a minimal impact on education? Research into hardware and software-based learning interventions has found that most have had either no impact, or a largely negative impact, on student learning.² Even countries which have invested heavily in ICT for education have seen only negligible gains, according to separate research by the OECD, a group of mostly rich countries.³ National education systems are proving to be stubbornly resistant to educational technology. One academic who spoke to the Atlantis Group summed up the general frustration: “Tech has captured our imagination for over 100 years. So why is it so difficult?”

It’s clear that EdTech can work. There are success stories in classrooms, districts and regions around the world. But at a national level, tech just isn’t moving the metre on learning by any measure that matters, from



reading and writing to maths and science. And when educational technology doesn’t work properly, it can cause major problems. One World Bank study that looked at EdTech policymaking found that botched tech adoption can disrupt teaching, take up too much of teachers’ time, and raise data-privacy concerns.⁴ It is also enormously expensive.

What’s going wrong? Researchers talk about a lack of independent evidence, which means it’s hard to know which technology, applications, and systems are effective and which aren’t. Developers talk about heavily localized procurement, which means that it’s difficult to scale-up successful tech – or to make a profit. And teachers are often

enthusiastic about tech, but are let down by an inadequate system or by their own lack of training.

All of these issues are political, rather than technological. The answers won’t come from putting more tech in classrooms.

They will come from better policymaking. Governments need to coherently integrate technology into the process of learning. To do that, policymakers should look to their country’s classrooms. They should speak to teachers and school leaders about their needs. They should think about the educational changes that they want to see. And then they should consider exactly which learning technologies can help to deliver these changes.

¹ Pilar Cuesta, Maria; Mingo, Florencia; Zacharias, Sharon. What are the most promising areas of technology initiatives in education? How can governments in low and middle-income countries in Latin America and Sub-Saharan Africa support these? Graduate School of Education, Harvard University and the Varkey Foundation (2018; paper available on request.)

² For a summary see eg, “Technological interventions increase learning—but only if they enhance the teacher learner relationship”, World Development Report 2018: Learning to Realize Education’s Promise, World Bank (2018), pp145-147. Citing data and analysis from Muralidharan, Singh, and Ganimian (2016, Appendix B).

³ Students, Computers and Learning: Making the Connection, PISA, OECD Publishing, Paris (2015)

⁴ Trucano, M., SABER-ICT Framework Paper for Policy Analysis: Documenting national educational technology policies around the world and their evolution over time. World Bank Education, Technology & Innovation: SABER-ICT Technical Paper Series (#01). The World Bank (2016)

Evidence

It's hard to know what works, and where

Solid data is the foundation of good policymaking. But with EdTech that data often just doesn't exist. Most developers will never have a chance to test their products at anywhere near the scale needed to establish their true efficacy. The schools and local authorities that purchase EdTech have little to no independent information on the products they buy. Few products face the scrutiny of independent randomized control testing, or other trials based around good qualitative research.

Such scrutiny is important. Where independent trials have been conducted, they have painted a mixed picture of the efficacy of even some of the most popular and widely available products. One expert who spoke to the Atlantis Group oversees randomized control trials of EdTech. She described the results of one damning study on a popular maths game:

“[The product] claims to make learning easy. But it removes all the hard part of the task – it's too easy. No matter how long children play the game, they get nothing out of it.”

It's clear that many products do work. Most experts who spoke to the Atlantis Group could point to examples of effective EdTech in schools today, or promising new products coming onto the market. The World Bank has also pointed to a number of success stories, amid mixed results on learning outcomes for EdTech overall.⁵ However, the lack of independent evidence about technology has also fostered a climate of cynicism. As one expert reflected:

“There is a lot of reaction against for-profit EdTech companies among academia. Not all of them are selling snake oil.”

Today's EdTech cannot automate learning. But it can make good teachers better. It can inform their decisions in the classroom, through more systematic data about their students' performance and behaviours. It can help teachers make learning engaging, interactive and innovative. It can help to open new perspectives and illustrate concepts in a better way. It can also help cut down on teachers' often onerous

administrative work. And technology can also make learning more accessible for disabled or special needs learners. As one Atlantis Group member reflected: “This variety is not new to EdTech, it's something that good teachers have always done – but EdTech facilitates this.”

Education ministers can help schools to sort the good technology from the bad. One way would be to establish a national commission on EdTech, mandated to gather independent evidence about technology in schools. Such a commission could work to establish a body of research about whether learning technologies are living up to their claims.

from users themselves. A review of effective approaches by the Omidyar Network, a philanthropic investment firm, has suggested that governments publish a catalogue of effective products and services, for example by drawing from user-generated reviews.⁶

Such moves would not be particularly costly, weighed against the cost of schools buying useless tech. But they would be a clear signal that central government is taking technology's potential for education seriously. In the short term, such action would steer schools and developers alike over what really works in a particular country and why.

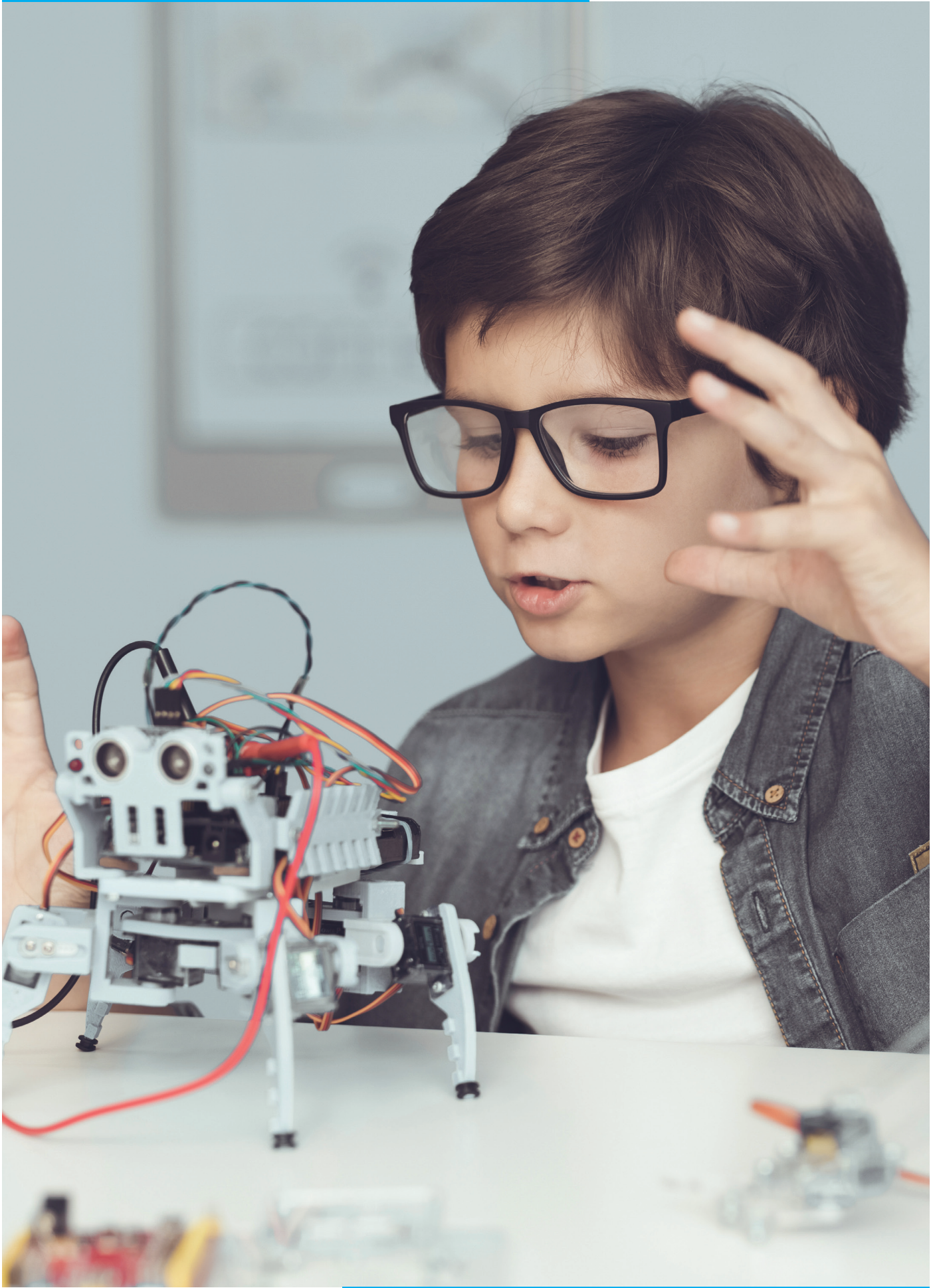


To be effective, such a commission needs direction. Ministers should be clear about the impact that they're looking for. A new technology, for example, may not move the needle on standardized exams if it also takes time away from memorization and teaching to the test. But it may enhance skills not assessed at the national level such as critical thinking, collaboration and computational thinking. The question for the minister is, what's the change that they want to see?

There are also a range of steps that education ministries can take to support teachers and school leaders. Peer-to-peer learning networks can help schools to learn from each other's successes – and mistakes. Governments can also help to foster an evidence base around EdTech, drawing

⁵ “Technological interventions increase learning—but only if they enhance the teacher learner relationship”, World Development Report 2018: Learning to Realize Education's Promise, World Bank (2018), p145-147

⁶ Scaling Access & Impact: Realizing the Power of EdTech, Omidyar Network (2019)



Infrastructure

Poor infrastructure keeps schools offline

A product that works well in one place may not work at all in another. Infrastructure, including access to mains electricity and the internet, is often a key barrier to EdTech's success at scale in low and middle-income countries. The issue is widespread. Roughly four out of every five schools in African countries lack access to electricity, along with almost three-quarters of village schools in India, according to data from UNESCO.⁷

Particularly hard served are education systems with poor access to the high-speed internet and cloud solutions demanded by today's more advanced learning technologies. As one expert told the Atlantis Group: "Most EdTech companies think it's fine to use cloud-computing, but in many schools around the world the basic connectivity doesn't exist."

Faced with these limits, some education systems are developing workarounds. Solar-powered technology, for example, can help schools cut off from the electrical grid. In many low-income countries, tech adoption is

being driven by mobile phones rather than desktops or specially built hardware. Global Teacher Prize Winner Peter Tabichi, for example, regularly uses his mobile phone as a teaching tool in his school in rural Kenya. Speaking to the Varkey Foundation for this report, he said: "the moment I introduced tech in school, the students became more creative – they wanted to come up with more innovative projects." His own students are banned from using phones at school, but he says they use them regularly at home to help with schoolwork.

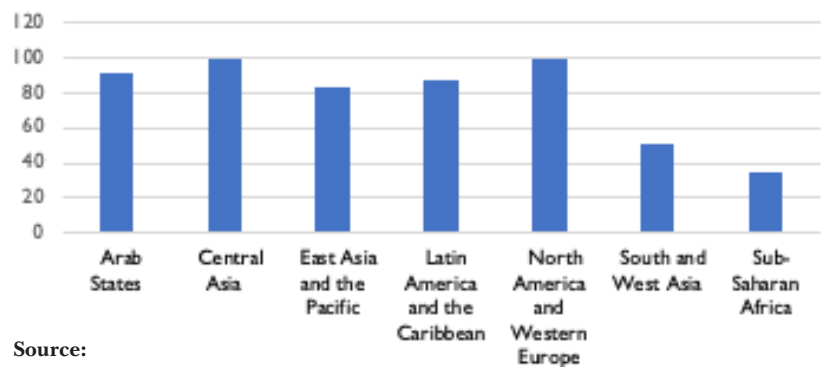
Most education ministers have little say in their country's infrastructure. But they can help EdTech developers to understand its limits. A national review of the digital infrastructure in schools would hand EdTech

developers the blueprints to build better products. Such a review should look at how well schools are served by the basics: mains electricity and high-speed internet. It should also identify the types of technology most suited to the context of the learners and teachers. In some countries, for example, learners predominately use mobile phones over more laptops or tablets.

These insights can save both schools and developers a lot of time and wasted effort. In the long run, they can get products that work into schools – and also save an education system a lot of money.

Just 7 out of 10 primary schools worldwide have electricity

Proportion of primary schools with access to electricity (%)

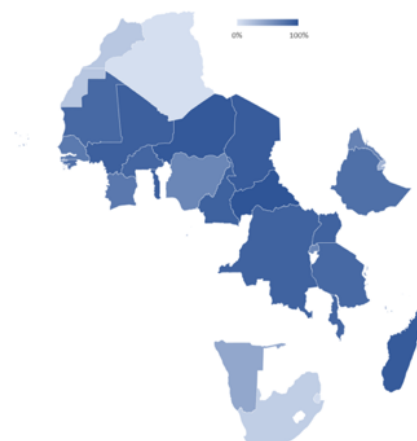


Source:

UNESCO UIS (regional-level data do not exist for Central Europe)

Many schools across Africa lack electricity

Proportion of primary schools without access to electricity, where data exists (%)



Source:

UNESCO UIS (there are no data for countries in white)

⁷ Electricity and education: The benefits, barriers, and recommendations for achieving the electrification of primary and secondary schools, UNDESA (2014), citing UNESCO UIS.

Procurement

Buying and selling EdTech is complicated – and costly

A product may cost millions of dollars to create. To stand any hope of recuperating that investment, developers must sell at scale. In practice, many have to go from school to school, or district to district. Much of EdTech procurement is highly localised and fragmented across different regions. Deals are hammered out in individual schools, and profits made or lost in closely fought margins. This means that promising products can vanish from the markets before they ever get a chance to prove their worth at scale. One developer who spoke to the Atlantis Group said:

“For most EdTech companies it’s a massive struggle to succeed because it’s hard to make money. Selling to schools and governments around the world is incredibly hard and companies like me really struggle – so technologies die.”

Letting schools, or local authorities, pick and choose their technology helps to make sure that they are getting the products they need. But this approach is likely to limit learning about what works at scale. It also makes EdTech adoption across a system incredibly piecemeal. A minister of education may find that every school in their country has cobbled together a different set of technological solutions, all of which may or may not be compatible with others. As one Atlantis Group member – who also leads an EdTech company – reflected: “EdTech doesn’t exist as an industry; there are all kinds of initiatives that don’t know about each other.”

Fundamentally, EdTech should save teachers’ time – and governments’ money. Learning technologies, in other words, should be a cost-effective approach to service delivery. The reality is often very different. As one Atlantis Group member argued:

“When you think about the effect that technology has achieved in virtually every industry, cost savings are at the forefront. From healthcare to consumer products, technology has allowed users to be better



served at lower costs. In education, the opposite is happening.”

Poor EdTech resourcing has arguably made education more expensive. It’s created new budget lines in education systems, and increased capital expenditures on hardware. Fundamentally, learning technologies should help governments to deliver educational services which, in their absence, would be impossible to afford.

All EdTech should pass the basic test of cost efficiency. In practice, this is easier said than done. At the national, regional and school levels, buyers often lack the basic information they need to weigh a product’s cost against its potential benefits. The problem is compounded at the policy level, as many governments still see learning technologies and other ICT as accessories to service delivery, rather than as essential components. The resulting situation has led one World Bank paper to, perhaps uncharitably, describe many investments in EdTech as “faith-based initiatives”.⁸

Education ministries have an important role to play in making EdTech procurement fair, transparent and cost-efficient. This doesn’t mean that policymakers should arbitrarily strip individual schools or districts of their power to buy the equipment they need. A one-size-fits all procurement solution would be ill-advised; as one expert who spoke to the Atlantis Group said:

“It’s incredibly difficult for any government agency to write a good procurement document – and very hard for a commercial organization to meet the needs of a good procurement document.”

The future may also see governments move away from one-size-fits all procurement solutions. Instead, a move towards micro-

services and micro-procurement may give schools access to a far more flexible system of digital tools. In the meantime, ministers could look at facilitating opportunities for buyers and sellers to meet and do business more effectively. Buyers’ fairs, sponsored by regional education authorities, can help buyers and sellers alike – they give buyers a chance to sell at scale, and schools a vital opportunity to compare similar products. Ministers can also look to the example of countries like the UK, which is now trialling regional buying hubs and even pre-negotiated buying deals.⁹ They could also examine the US, where the government has issued a number of procurement guidelines to assist developers and schools.¹⁰

Policymakers looking for more innovative or cost-saving models can also look further afield, to open-source solutions. Some countries such as India are already moving toward a set of open-source educational resources, on which private providers can build their solutions. Crucially, this means that data from these products are interoperable: they can be shared across different systems.

At the international level, there is also growing interest in EdTech created through open-source collaboration, where profit is not the principal motivator. The UNICEF Innovation Fund, for example, invests in open source solutions to improve the lives of children. Its portfolio includes a number of EdTech-based interventions.

More broadly, ministries should ensure procurement processes are focused on technology which promotes learning and teaching, rather than more generic hardware and software. Rather than measuring success by the number of computers or tablets in schools, policymakers should look at the learning technologies now available to teachers and learners.

⁸ Trucano, M., SABER-ICT Framework Paper for Policy Analysis: Documenting national educational technology policies around the world and their evolution over time. World Bank Education, Technology & Innovation: SABER-ICT Technical Paper Series (#01). The World Bank (2016)

⁹ Realising the potential of technology in education: A strategy for education providers and the technology industry, Department for Education (2019)

¹⁰ See, eg, Ed Tech Developer’s Guide, US Department of Education (2015)

Teachers

Teachers are often unable or unwilling to use EdTech

Today's EdTech can offer a set of learning interventions. It cannot yet provide the continuum of learning demanded by education systems at scale. That is something which only teachers can do. The demand for learning technologies from teachers, however, is often poorly understood by developers and policymakers alike. Both, as one expert put it to the Atlantis Group, tend to offer teachers solutions in search of problems.

Most teaching effectively happens behind closed doors. Teachers therefore have little incentive to use technology that they don't want or don't understand. Fundamentally, teachers must want to use technology because they believe that it will offer a more effective approach than what they are already doing. But few teachers seem to believe that they need more guidance around tech. In an OECD poll of teachers in 48 countries and economies, less than 20% of teachers said that they had a high need for professional development in ICT for teaching.¹¹

For governments to get teachers to adopt EdTech, they need to offer need two things. The first is adequate training into how to use the learning technologies effectively, including practical experience in the classroom. Training, where it does exist, is often divorced from pedagogy – from teaching and learning. Developers and policymakers alike should not overestimate teachers' capacity to use ICT, beyond the most basic administrative tasks. Research by UNESCO, for example, shows that very few adults around the world can do more on the computer than copying and pasting files, or attaching files to emails.¹²

Some countries do offer teachers basic training in ICT, particularly during Initial Teacher Training programmes.¹³ There is also evidence that a number of countries are beginning to prioritise in-classroom experience of such technology. Recent guidance from the US Department of Education, for example, recommends that pre-service teachers gain "program-deep and program-wide" experience with ICT.¹⁴ The UK, meanwhile, has recently launched

online training courses for leaders and education leaders.¹⁵

However, such training is neither widespread nor systematic in most education systems. Just 56% of teachers polled by the OECD reported that they had received formal training in ICT for teaching. In the US, widely seen as a global leader on EdTech, that figure is just 63%.¹⁶ And where training is available, it is often an add-on or retrofit rather than an essential component.

As a result, educational technology may be too advanced for many users. As one Atlantis Group member noted: "We've heard time and time again that if you run ahead of the teaching profession it has a very negative impact on implementation of EdTech. The focus needs to be on training of teachers and drawing them in."

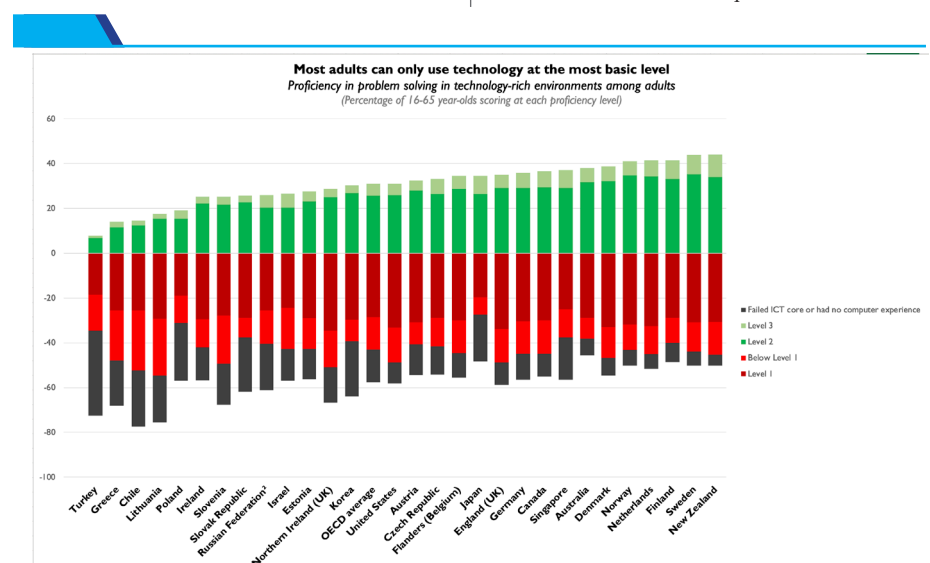
The second thing ministers can do is to facilitate a process to give teachers a clear vision of how these products fit into the wider structure of learning that they are charged with delivering. The Atlantis Group has considered a range of different products over the course of its inquiry, each of which addressed a specific issue or provided teachers with a specific tool. But what contributors left unaddressed was how these products fit into the continuum of learning that teachers oversee. Practically, teachers need to understand how these different products are all supposed to work together in a classroom or school. They also need

to understand how tech can enable their practice.

That is where education ministers can help. Fundamentally, teachers must see EdTech as more than the sum of its parts, rather than a collection of unconnected interventions. EdTech needs to be integrated with the curriculum, rather than as an add-on. As one Atlantis Group member said: "Teaching is not just a collection of tricks, it's a structured thing. How does that structure fit in with EdTech?"

Teachers should also be able to rely on a network of support that extends beyond their school. Making EdTech a success takes many hands, from teachers and school leaders, to business and infrastructure, to civil society groups and local government.¹⁷ Schools themselves are networked organizations with ties that extend far into their local communities. It takes an ecosystem of such stakeholders to build and sustain learning technologies, as well as to take them to scale. Teachers should not be asked to shoulder the responsibility of technology by themselves.

Governments should work to foster such local ecosystems. There is much that policymakers can do to help members of these communities to grow and learn from each other. A significant first step would be for education ministries to facilitate peer-to-peer learning opportunities for schools themselves, to help them to learn hard-won lessons about EdTech implementation.



Source: OECD Survey of Adult Skills (PIAAC) (2012, 2015), Table A2.6

¹¹ Figure I.1.1, TALIS 2018 Results (Volume I): Teachers and school leaders as lifelong learners (OECD), 2019

¹² "Target 4.4: Skills for work", <http://gem-report-2019.unesco.org> [accessed 24 May 2019]

¹³ Trucano, M., SABER-ICT Framework Paper for Policy Analysis: Documenting national educational technology policies around the world and their evolution over time. World Bank Education, Technology & Innovation: SABER-ICT Technical Paper Series (#01). The World Bank (2016)

¹⁴ "Advancing educational technology in teacher preparation: Four guiding principles", Reimagining the Role of Technology in Education: 2017 National Education Technology Plan Update, Department of Education (US)

¹⁵ Realising the potential of technology in education: A strategy for education providers and the technology industry, Department for Education (UK)

¹⁶ Figure I.1.1, TALIS 2018 Results (Volume I): Teachers and school leaders as lifelong learners (OECD), 2019

¹⁷ Scaling Access & Impact: Realizing the Power of EdTech, Omidyar Network (2019)

Conclusion

Taming education's Wild West

EdTech is an uncharted frontier for policymakers, but it doesn't have to be the Wild West. It's the job of developers to push the boundaries of what is possible. But it's the responsibility of ministers of education to realise EdTech's full potential in the real world.

At a political level, that means addressing key issues around evidence, infrastructure, procurement and teaching and learning. But it should also mean articulating a clear political vision for EdTech. Too many policymakers treat technology largely as a supplement or retrofit to traditional education. Around the world, governments have focused largely on putting more and more hardware in classrooms, as well as digitizing their existing learning resources.

This approach has succeeded in putting more ICT in classrooms than ever before. But globally it has had resulted in only diminishing returns for learning. On average, 72% of students across OECD countries now say they use computers at school. But most report that they use them to browse the internet, rather than for practice or simulations.¹⁸ Teachers and students, in other words, aren't doing anything fundamentally different to before. As one expert who spoke to the Atlantis Group said: "In EdTech 1.0 we were digitizing traditional models – we just gave everyone a computer. Nothing has really changed, we've just added tech, overlaid over the existing framework."

This is an enormous waste of time and resources. To realise EdTech's promise, policymakers need a clear strategy for ICT and how it serves learning throughout the



system. In practice, however, such visions are few and far between. A World Bank review of ICT policymaking for education around the world has concluded that very few countries have working EdTech strategies. Many have no EdTech strategy at all. Others have policies cobbled together from the disparate strategies of different sectors, or strategies working in practice which have never been officially adopted.¹⁹

It's time to break the cycle of political failure around EdTech. Ministers of education should consider examples of best practice where they do exist, notably in Singapore, the UK and the US.²⁰ They may also ask themselves searching questions about what's working, and what's not. Fundamentally, education ministries must be prepared to see EdTech as more than a supplement to traditional education. Instead, they must work to identify the most effective technology, and integrate it gradually into day-to-day classroom practice. To accomplish that, education leaders can look to the next wave of educational technology: EdTech 2.0.

¹⁸ Students, Computers and Learning: Making the Connection, PISA, OECD Publishing, Paris (2015)

¹⁹ Trucano, M., SABER-ICT Framework Paper for Policy Analysis: Documenting national educational technology policies around the world and their evolution over time. World Bank Education, Technology & Innovation: SABER-ICT Technical Paper Series (#01). The World Bank (2016)

²⁰ See eg ICT Masterplans (Singapore), Realising the potential of technology in education: A strategy for education providers and the technology industry (UK) and National Education Technology Plan (US)





2. EdTech tomorrow

Future, tense

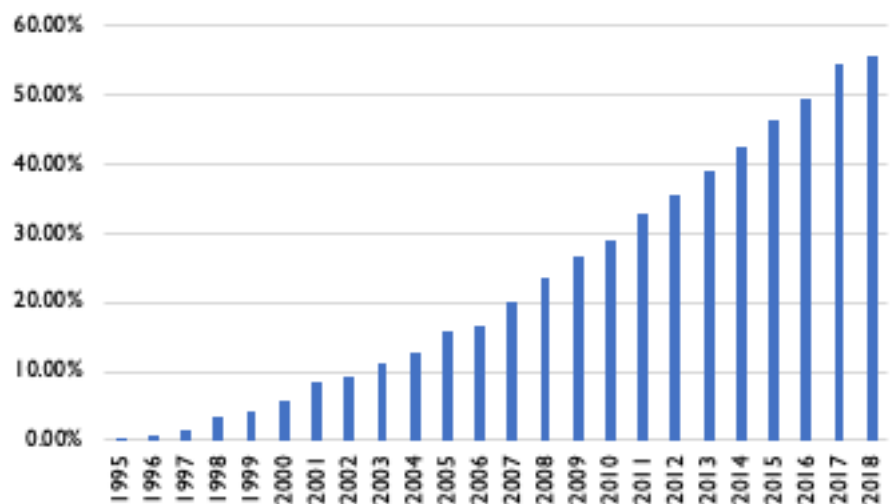
TODAY'S SMARTPHONES are more powerful than many of yesterday's supercomputers. By one estimate, processing power has increased by a trillion fold since the 1950s.²¹ More people are also online than ever before. Twenty years ago, less than 5% of the world's population used the internet. Today, over half of it does.²² As technology becomes ever more powerful, its impact on our global society is growing. So far, it has struggled to deliver at scale on education. Tomorrow's learning technologies may be a different story.

Ministries of education can no longer ignore the transformative power of technology. The global spread of digitisation, automation and mass communication is fundamentally changing the demand for skills in labour markets across the world.²³ The classroom and curricula cannot remain offline and off-limits to technological advancements. In practice, digital technology is already a fact of life in much of education – for better or worse. Over half of teachers polled by the OECD in 56 countries and economies reported that they frequently let students use ICT for projects or class work.²⁴

But today, most traditional educational models either operate offline or incorporate technology as an add-on or retrofit. This approach, now decades old, is failing to deliver the skills and competencies needed for young people to compete in the global workplace. Research in 28 OECD countries has found that over 50% of adults have next to no ICT skills at all.²⁵ Learners are leaving school ill-equipped to navigate a world where technology is ubiquitous.



Today, about 60% of the world is online
Growth in internet users as % of world's population, 1995-2018



Source:
Internetworldstats.com

²¹ "Processing power compared: Visualising a 1 trillion-fold increase in computing performance", pages.experts-exchange.com [accessed 29 May 2019]

²² "Internet growth statistics", internetworldstats.com [accessed 31 May 2019]

²³ Eg The Future of Jobs Report 2018, Centre for the New Economy and Society, World Economic Forum (2018); World Development Report 2019: The Changing Nature of Work, World Bank (2019); and Future of Skills: Employment in 2030, Pearson and Nesta (2017)

²⁴ Figure I.1.1, TALIS 2018 Results (Volume I): Teachers and school leaders as lifelong learners (OECD), 2019

²⁵ Policy Brief on the Future of Work: Skills for a Digital World, OECD (2016)

Teachers

Tomorrow’s teachers may need to know less than they do today

Today, any learner with access to the internet has instantaneous access to information on any subject taught in a classroom. But bits and pieces of information, of course, are not knowledge – that still requires a guide and a continuum and curation of learning that only teachers can provide. The internet can show you almost anything you want to see. But it can’t replace a teacher who can tell you what it all means, and how it fits together. To do that, good teachers need to have a thorough understanding of their subjects. As one Atlantis Group member has said, simply: “Good teachers need to know a lot.”

But such teachers are also in short supply globally. Around the world, many teachers lack a solid foundation of their subjects or enough pedagogical knowledge to do their jobs. This in turn is fuelling a global learning crisis. Today, six out of 10 children and adolescents around the world are not learning the minimum in reading and mathematics, according to UNESCO.²⁶ The majority are in low-income countries in Asia and Sub-Saharan Africa. Despairing governments are increasingly turning to technological solutions to supplement their teachers’ knowledge and skills. Such moves have often proved controversial. But they are likely to remain a key trend for the future.

There are a range of different models in use. One effective approach, deployed by the Varkey Foundation in Ghana, uses satellite

technology to broadcast high-quality, interactive lessons from qualified teachers into remote classrooms.²⁷ The programme’s initial results have been promising, with gains in literacy and numeracy among girls from disadvantaged communities. In a world without enough good teachers, such technology offers today’s education ministers a limited workaround. But it’s still based on the fundamental principle that technology can only augment good teaching, and not replace it. Information in these models is still delivered by teachers, not technology.



The future may turn that principle on its head. The OECD, for example, has argued that the job of a teacher needs to change from that of imparting information. Instead, some researchers argue, the role of the teachers should be to coach their students through the broad spectrum of knowledge, skills, values and attitudes demanded by the 21st Century.²⁸

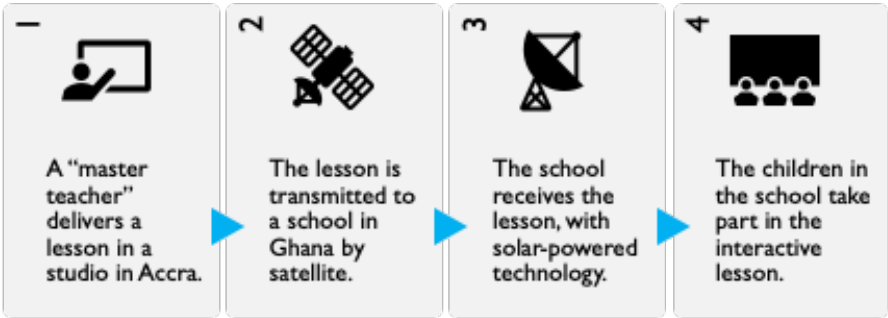
If this shift happens, it will be enabled by technology. One academic who spoke to the Atlantis Group predicted that educational technology will eventually relieve teachers

of this “knowledge burden”. Instead, they argued, learners will access information autonomously relying on technology – and teachers will coach learners through the process. In the future, the expert said, the best teachers may be mentors, rather than information-banks. Or, as the expert put it, “Your PE teacher could teach your physics.”

This prediction is controversial – and it’s strongly contested by some members of the Atlantis Group. Such a fundamental shift, if it does happen, may still be far away. It looks unlikely that robots will replace teachers any time soon. What is clear, however, is that learning technologies will be able to augment effective teaching. Technology will be able to help teachers to be more creative, accessible and evidence-led. That in turn may be increasing important in a world in which society is asking teachers to fulfil more and more roles in the lives of children and young people.

Around the world, governments are increasingly foisting additional responsibilities on teachers. Today, teachers are already expected to address issues such as global citizenship, digital literacy, climate change, and even weapons in schools. As learning tech proliferates, teachers may increasingly come under pressure to act as curators and quality control for digital content. Governments should recognise that this will place additional pressure on an already over-stretched profession. EdTech should enable the work of teachers, rather than represent an additional responsibility amid a myriad of others.

Technology can put good teachers in front of the learners who need them the most
The Making Ghanaian Girls Great! project



Source:
Varkey Foundation

²⁶ More Than One-Half of Children and Adolescents Are Not Learning Worldwide, UIS Fact Sheet No. 46, UNESCO Institute for Statistics (2017)
²⁷ “Making Ghanaian Girls Great!”, varkeyfoundation.org [accessed 29 May 2019]
²⁸ See eg OECD Future of Education and Skills 2030 Concept Note, OECD (2019)

Artificial intelligence

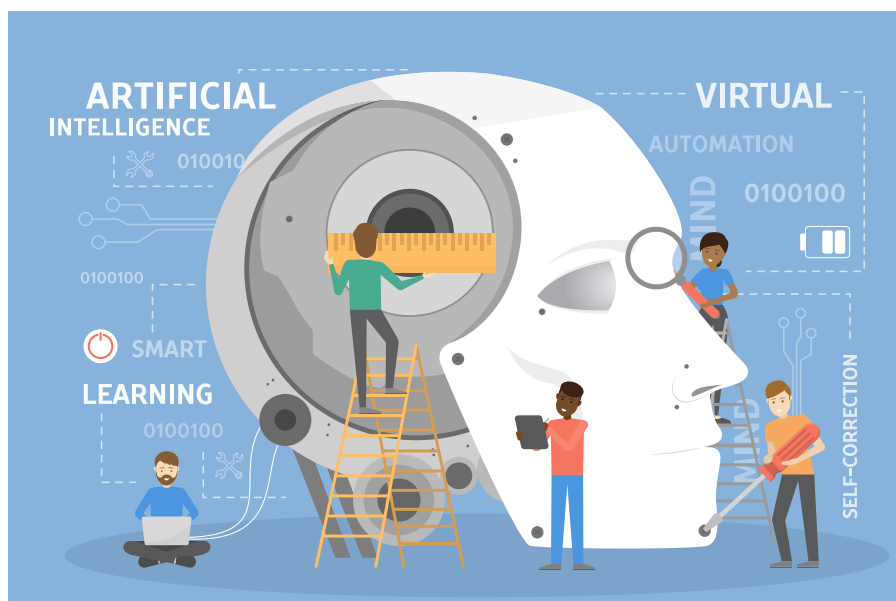
AI may help to personalize learning

We are being watched. Artificial intelligence is increasingly being deployed across different sectors. In return these programmes curate our personal lives, sorting our news timelines and arranging our photos, making music recommendations, and suggesting what time we should leave to beat the traffic. Behind the scenes, this technology is increasingly taking over day-to-day decision-making in industry and business; investing in stocks, replenishing supermarket shelves and even identifying criminal suspects. What could this technology do for education?

Many EdTech experts who spoke to the Atlantis Group argued that the future of education lies in “personalized” learning programmes driven by artificial intelligence. Such technology gathers data about a learner’s performance over time, and suggests different interventions to help them improve. As one developer put it:

“With our system you create a tailored, unique learning experience optimised by student needs. We’re using deep neural networks that map the knowledge state and goals of a student.”

But understanding what artificial intelligence actually knows about students’ learning is complicated. And pinning down what personalization actually means in terms of education can also be difficult. When asked by the Atlantis Group, expert contributors offered a range of different definitions. One stated: “It’s around creating personalized learning paths through competencies.” Another argued that personalization is: “a learning process that adapts your strengths.” A third noted that the purpose of personalized learning is simply to deliver “the right lesson to the right student at the right time.”



All three examples may serve as working definitions for the developers – and for the people using the products. But all also speak to different ideas of what personalization is.

As one Atlantis Group member reflected:

“The world ‘personalization’ was the most frequently used idea for what a system might look like in the future, but people seemed to use it to talk about individualization, while all of us around this table [the Atlantis Group] think of learning as a social process.”

But a personalized approach does have promise. It’s a well-established principle that effective education systems should make sure that the teaching considers the level of the student. In practice, however, it is difficult to do this for each and every student in the system. In many systems just a fraction of learners are able to keep up with the curriculum, and most others fall behind.²⁹ Personalization technology offers a range of powerful new diagnostic tools to help keep learners and teachers on pace. At scale, it

could help ministers to understand how learners across the country are keeping up with the curricula.

Such technology may be a particularly powerful approach for remedial or supplementary learning, to help the weakest and most disadvantaged learners keep up with the curriculum. But such an approach still requires the intervention of a teacher, to ensure that students are actually learning instead of just passing badly designed routine tests. Policymakers will need also to work to ensure that such technology serves the learner as a whole, based on a comprehensive curriculum. As one Atlantis Group member argued:

“Personalized teaching is only good up to a point, because we don’t want students to learn [only] what they want; we want them to have a basic knowledge of language, history, et cetera. Personalized knowledge should be a way of helping to progress through the curriculum with some flexibility.”

²⁹ “Teacher skills and motivation both matter (though many education systems act like they don’t)”, World Development Report 2018: Learning to Realize Education’s Promise, World Bank (2018)

Data

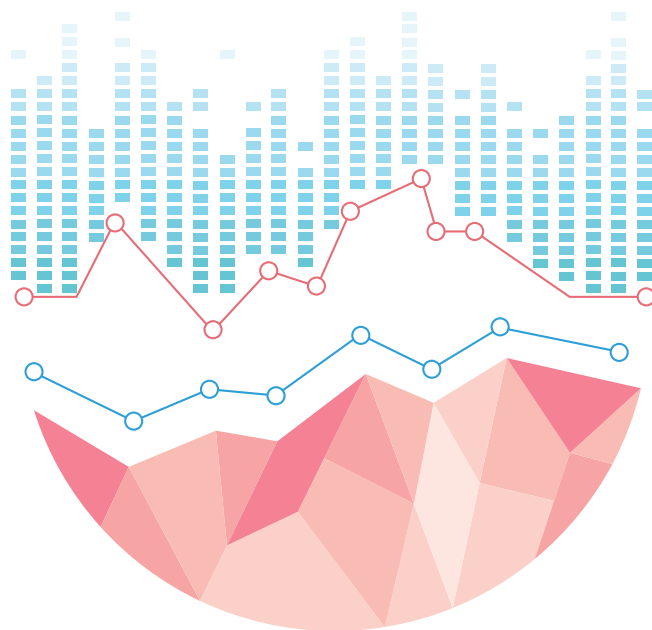
Data-driven learning could be the future of education. But at what cost to learners' privacy?

Our digital world is built on data. Big data has transformed the way we do business, and the ways that industry works. The market for such data will reach \$189 billion, this year according to a forecast by the International Data Corporation. The organization predicts the market will be worth over \$274 billion by 2022.³⁰

Around the world, business and industry are moving to take advantage of the windfall of information on consumers. A major survey of employers by the World Economic Forum found that 85% expect to use big data analytics by 2020.³¹ The sheer amount of available data now goes far beyond what most organizations are able to meaningfully process. A recent study by McKinsey Analytics found that many business and IT leaders were increasingly overwhelmed by the volume and variety of data.³²

What will the rise of big data mean for education? Many education systems around the world still struggle to gather basic data around the quality of learning. To some extent, this is a problem that the international community is already working to address. In July 2019, for example, UNESCO and the World Bank announced a partnership to strengthen assessment systems and measure learning.³³ But for the time being few education systems have the quality and quantity of data they need to deliver truly data-driven learning. Today, the leaders of international businesses have an extraordinary array of data and analytics at their fingertips. Many national policymakers, by comparison, are still forced to work in the dark.

EdTech may eventually offer a solution. As learning technologies grow across systems, they will give policymakers and teachers alike access to more and better data on their learners. Today's EdTech is already



offering a glimpse at the possibilities, from what happens in the classroom to national assessments. But these are still only glimpses. And much of the data that today's tech provides are not interoperable: they can't be shared or compared across different systems of learning. For a ministry of education, it's a kaleidoscope of different data rather than a coherent picture.

For today's education ministers, then, the emergence of AI and growth of digital data represent an unprecedented opportunity. It is also an enormous ethical and logistical challenge. Unregulated, AI deployment and data collection carry enormous risk. Personalization programmes, for example, work by harvesting the data of their users. They can collect an extraordinary wealth of data on learners, from their vital statistics, to their learning performance, behaviours and even physical location.

As the use of such technology expands, it is generating unprecedented amounts of data on learners around the world. Governments and tech companies have a commensurate responsibility to make sure that this data isn't misused or mislaid. The growing number of public and private stakeholders

involved in data collection and analysis of learners raises enormous ethical concerns. As does putting the delivery of learning in the hands of AI-powered programmes.

Education ministries should therefore ensure sufficient regulation and standards exist to protect the right to privacy of learners – in particular children and young people. International law and standards set out three basic tests on mass digital data collection: necessity, proportionality and legality. In other words, EdTech should not be able to collect more data than what's required to complete the learning specific task it's designed for. The gathering of that data should be proportionate to the intervention required. And it should be subject to procedural safeguards and effective, independent oversight.³⁴

Learners should have the protection of the law against arbitrary interference with their privacy. At a minimum, this should mean that tech companies cannot collect more data than is needed. They should not be able to retain it beyond reasonable limits. Nor should they be able to convey or sell such data on to other companies or governments.

³⁰ IDC Forecasts Revenues for Big Data and Business Analytics Solutions Will Reach \$189.1 Billion This Year with Double-Digit Annual Growth Through 2022, International Data Corporation (2019)

³¹ The Future of Jobs Report 2018, Centre for the New Economy and Society, World Economic Forum (2018)

³² Analytics comes of age, McKinsey Analytics (2018)

³³ UIS and World Bank Join Forces to Help Countries Measure Student Learning, UNESCO UIS (2019)





Curricula

Big data should mean better decision-making – and quicker change-making

It can take a long time for an education reform to reach the classroom from the cabinet office. In practice, however, most education ministers have little idea what these reforms actually accomplish. OECD countries adopted no less than 450 education reforms between 2008 and 2014. Just 10% were evaluated for their impact.³⁵

Many education ministers come into office with big changes in mind. But they have little information about how their strategies are playing out from day to day in classrooms around the country. By the time that such systematic data on learning outcomes does become available, such as through national examinations, it's often too late to change anything. As one EdTech expert told the Atlantis Group:

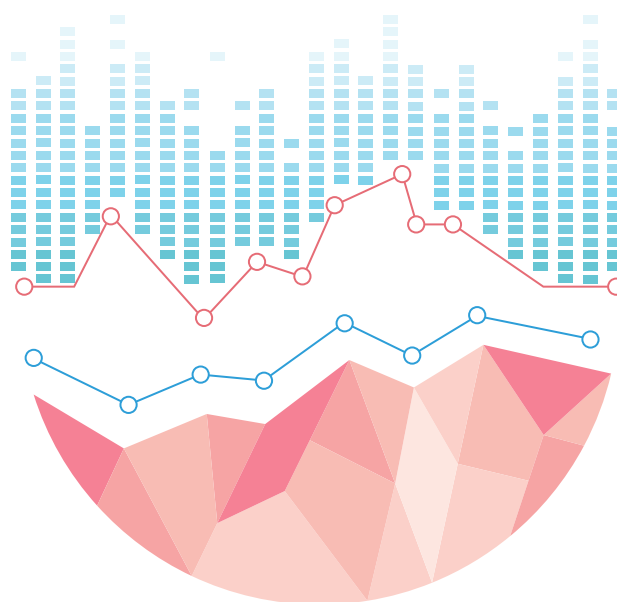
“Every time an education system has attempted to redesign its curriculum they would assume that it's a long term-solution. But in reality, things are changing fast. We need to make curricula adaptive.”

New educational technology may offer a solution. Personalized learning products, for example, may allow ministers to understand how learners across the system are keeping up with the national curricula. Digital assessments may help ministers to understand how learners behave under test conditions, and whether the tests themselves are pitched at the right level for the majority of learners. Such data can shed new light on why learners fail. As one expert in digital assessment systems put it: “The time spent just looking for what to solve becomes a scary proportion of the test time.”

In the future, many ministers of education will have access to better data on their learners than ever before. Education authorities will be able to better understand

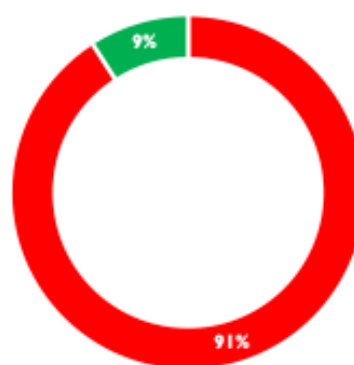
what learners know about their subjects. They will understand how learners behave under pressure. And they will see what learners do when they feel they are falling behind the curve. This, in turn, should help to inform better education policy. The digitization of education, though limited in what it can achieve in improving learning outcomes, may also help to address systemic issues more easily: textbooks can be corrected overnight, rather than taking months. A software patch, rather than a new operating system.

Truly adaptive curricula, along with systemic data-driven learning, are still many years away. They are far beyond what today's piecemeal adoption of educational technology can deliver. But they do represent EdTech at its fullest potential. And today's education ministers can do more to learn from the technology that's already in use across their systems. One way would be to invite technology companies to submit key learnings as part of consultations around new national curricula.



Most education reforms aren't evaluated % of education reforms evaluated in OECD countries, 2008-2014

■ Unevaluated ■ Evaluated



Source:
OECD Education Policy Outlook (2015)

³⁴ The right to privacy in the digital age, Report of the Office of the United Nations High Commissioner for Human Rights (A/HRC/27/37, 2014)

³⁵ OECD, Education Policy Outlook 2015: Making Reforms Happen (2015)

Conclusion

A vision for tomorrow

Predicting the future is notoriously difficult; preparing for it doubly so. But education ministers should also recognize that the world is turning, and things cannot stay as they are. Schools and classrooms may remain closed off from educational technology and ICT, but not teachers and learners. They are already using tech in their everyday lives to connect, talk – and learn. Technology is a fact of our everyday lives. As one Atlantis Group member reflected:

“As humanity we are amassing huge potential of power. How does this next generation use this power? This is an issue of values – something we need to imbue much more in school.”

It is self-evident that governments cannot keep their education systems closed to technology forever. That genie cannot be put back in the bottle. Instead, education ministers have an opportunity to harness technology’s potential. The alternative is to do nothing while tech continues to disrupt education with little benefit to learners or teachers alike.

The answer lies in better policy, not more hardware. Governments around the world have flooded schools with computers and other technology. But for the most part they haven’t prepared teachers or learners to use them. They have provided the equipment, but not the operating manual.

It’s hard to make coherent policy around EdTech. But there are four guiding principles that ministers should bear in



mind: evidence, teachers, markets and vision. Effective EdTech policy prioritizes independent evidence about what works. It integrates tech into teaching and learning. It makes sure that the right products are reaching the market. And – crucially – it sets out a vision for EdTech across the education system.

In the long run, a culture shift is needed within governments themselves. Incremental steps are needed by education ministers to move education systems towards data-driven learning. National policymakers should work to build capacity within their education system to experiment and innovate, to better understand how teaching and learning in the classroom can be transformed.

Such a model would need to put learning technologies at the centre of learning, rather than on the periphery.

Such a fundamental change can’t happen overnight. But there are a range of practical things that education ministers can do in the meantime to begin to prepare their systems to realise the potential of learning technologies.

3. Policy toolkit



Four tests for ministers of education

WHAT DOES good EdTech policy look like? Today there are few international standards in place to guide ministers of education. The following document, adopted by the Atlantis Group, offers some basic principles for ministers to consider.

Broadly speaking, effective policy around education technology should pass four basic tests: are the products improving learning? Are teachers equipped to use them? Are the best and most appropriate products reaching the market? And do the products fit into a wider education strategy?

The Atlantis Group invites current ministers of education to test education technology implementation in their country against the following four questions. It also makes a number of key recommendations for governments on how to make effective policy around EdTech.

1. How effective are the products?

There is little independent evidence about what EdTech works at scale. The result is that it's difficult for schools, districts and governments to buy effective products. One World Bank study, for example, has described investments in educational technology in many countries as "faith-based initiatives".³⁶ Ministers of education can help by fostering a culture of evidence gathering around EdTech. This, in turn, will help to make sure that schools and other buyers are purchasing effective technology.

The Atlantis Group urges ministers of education to:

- **Gather evidence about efficacy.**

Facilitate pilot programmes of the most promising EdTech products at regional and national levels and commission rigorous, independent assessments of their efficacy, drawing on international expertise where required.

- **Set up testbed schools.**

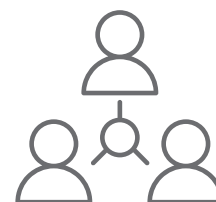
Set up a network of testbed schools to trial products and services, which use participatory design processes to involve pupils and teachers in the design of the product. Such testbeds should be subject to a clear remit and time limit.

- **Map the infrastructure.**

Commission a comprehensive review of schools' digital infrastructure by region and make the results publicly available, including eg access to electrical grids, high-speed and wireless internet, and the electronic software and hardware in most common use.

- **Set up stakeholder expert communities.**

Set up communities of EdTech stakeholders in different regions. Such communities should serve to enhance the dialogue between government, educator, evidence and start-up. They should also help to establish the evidence of impact from testbeds.



³⁶ Trucano, M., SABER-ICT Framework Paper for Policy Analysis: Documenting national educational technology policies around the world and their evolution over time. World Bank Education, Technology & Innovation: SABER-ICT Technical Paper Series (#01). The World Bank (2016)

2. How does EdTech support teachers?

Teachers need to have a say in the technology they use in the classrooms. They also need adequate training to use EdTech, including practical experience in the classroom. Ministers of education can help by consulting with teachers over their needs and building their capacity at each stage of teacher development.

The Atlantis Group urges ministers of education to:

- **Ensure that learning technologies and their use in the classroom is integrated into teacher education and professional development.**

Work with teacher education institutions and organizations to ensure that technology is considered in teacher training before the teacher begins to teach in the classroom. Develop a teacher's acumen and their ability to integrate technology in pedagogy and their teaching practice as part of their initial teacher training, as well as professional development programmes.

- **Understand teachers' needs.**

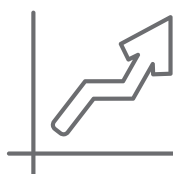
Commission a national needs-assessment with teachers and school leaders on education technology. Such an assessment should identify the levels of readiness in the teacher workforce to use education technology, the specific pedagogical demands for such technology, and where technology can assist teachers in their non-teaching administrative tasks.

- **Build teachers' capacity.**

As part of a holistic approach towards teacher development, ensure that Digital Literacy and proficiency with the most commonly used hardware and software platforms are integral to Initial Teacher Training and Continuous Professional Development programmes, and prioritize in-classroom practice.

- **Assess EdTech-use as part of performance reviews and incentive programmes.**

Include usage of learning technologies and other EdTech in teachers' performance reviews and incentive programmes, to ensure that technology is being used effectively and teachers' needs are being met.



3. Are the right products reaching the market?

Buyers and sellers often find it difficult to do business effectively. Ministers of education can help by setting out guidelines for what products are needed and where. They can also help to facilitate ease of business, through buying hubs and regional events.

The Atlantis Group urges ministers of education to:

- **Make EdTech purchasing more cost-effective.**

Ensure that EdTech buyers at all levels are required to complete a rigorous cost-effectiveness analysis before purchasing new products. At the most basic level, such an analysis should identify the desired educational outcome and compare the cost of the proposed EdTech intervention against that of a conventional approach.

- **Help buyers understand the market.**

Publish clear purchasing guidelines for buyers, with a checklist for efficacy, sustainability and cost-benefit. Where possible, make reference to examples of existing types of products that schools have adopted successfully.

- **Make it easier for buyers to meet sellers.**

Facilitate opportunities for buyers to meet sellers, including for example holding or sponsoring regional events and competitions.

- **Help sellers to sell efficiently and at scale.**

Trial buying hubs in different regions, in which sellers can present their products to groups of schools.

- **Help developers to make sure their products function and are relevant in the national context.**

Facilitate opportunities for developers to meet with teachers, school leaders and relevant authorities to develop new products within the national ecosystem, and trial them on a limited basis. More broadly, establish a dialogue between government and EdTech developers.

- **Work with the private sector to overcome data silos.**

Experiment with new business models between the public and private sector to facilitate a more open, transparent collaboration. Such models should focus on overcoming the current challenges of data silos and lack of interoperability.



4. How does EdTech fit into the wider education strategy?

Most EdTech policy is piecemeal and limited in scope. Ministers need to set out a clear vision for how technology can augment and inform education systems at each level. Such a strategy should also include key stakeholders from different sectors, including representatives of teachers, researchers and business. More broadly, it should also be guided by the educational changes that governments want to see in the classroom.

The Atlantis Group urges ministers of education to:

- **Develop a national strategy for EdTech.**

Develop a comprehensive strategy for EdTech and its role in national education action plans and curricula, in consultation with the education sector. Such a strategy should focus on the educational changes desired in classrooms and schools, and how technology can deliver them. Ensure that such a strategy relies on the needs of teachers, school leadership and learners, rather than those of IT consultants.

- **Consult with all stakeholders:**

When defining Technology in Schools strategies, ensure that there is a consultancy process with expert stakeholders driven by education experts and supported by technologists and IT specialists.

- **Adapt strategy and curricula.**

Establish a periodic review of key learnings drawn from education technology implementation to inform the development of national action plans and curricula.

- **Share learnings.**

Set up peer-to-peer learning opportunities for schools to learn from each other about EdTech implementation. This could include, for example, ‘demonstrator schools’ to showcase best practice.

- **Set up a cross-sector task force.**

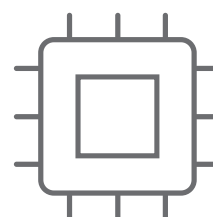
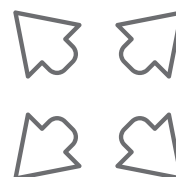
Establish an independent, cross-sector commission with a mandate to inform the government’s education technology strategy. The membership of such a commission should include representatives of the education sector, business and relevant academics, including learning science and pedagogical experts – and should have powers to draw on international expertise where required. This task force should enhance the dialogue between government, educator, evidence and start-up.

- **Protect privacy.**

Set clear standards for the collection, storage, retention and dissemination of personal data on learners and teachers. Strictly limit the powers of technology companies to sell or pass on such data to third parties. Ensure that all learners have the protection of the law against arbitrary interference with their right to privacy.

- **Ensure that the use of AI is transparent, unbiased and accountable.**

Set clear chains of accountability within the ministry of education for the deployment of artificial intelligence in public education. Develop quality checks for deep-learning algorithms and their use in public education, focused on eliminating AI bias and drawing on international expertise where necessary.





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Zlatko Lagumdžija

Chairman of the Council of Ministers of Bosnia and Herzegovina [2001-2002]

Ju-Ho Lee

Minister of Education, Science and Technology of South Korea [2010-2013]

Brother Armin Luistro

Minister of Education, Science and Technology of the Philippines [2010-2016]

Silas Lwakabamba

Minister of Education of Rwanda [2014-2015]

Bálint Magyar

Minister of Education of Hungary [1996-1998; 2002-2006]

Steve Maharey

Minister of Education of New Zealand [2005-2007]

George Papandreou

Prime Minister of Greece [2009-2011]; Minister of Education and Religious Affairs of Greece [1994-1996]

Hekia Parata

Minister of Education of New Zealand [2011-2017]

Remus Pricopie

Minister of Education and Research of Romania [2012-2014] and State Secretary of Higher Education and Research of Romania [2007-2008]

Jo Ritzen

Minister of Education and Science and of Education, Culture and Science of the Netherlands [1989-1998]

Jamie Saavedra

Minister of Education of Peru [2013-2016] Global Director for Education, World Bank Group [current role]

Sabri Saidam

Minister of Education and Higher Education of Palestine [2015-2019]

Najat Vallaud-Belkacem

Minister of Education, Higher Education and Research of France [2014-2017]

Androulla Vassiliou

European Commissioner for Education, Culture, Multilingualism and Youth [2010-2014]

Josefina Vázquez Mota

Secretary of Public Education of Mexico [2006-2009]

Srdjan Verbić

Minister of Education, Science and Technological Development of Serbia [2014-2016]

George K. Werner

Minister of Education of Liberia [2015-2018]







“ IT’S TIME TO BREAK
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