REIMAGINING HUMAN CONNECTIONS
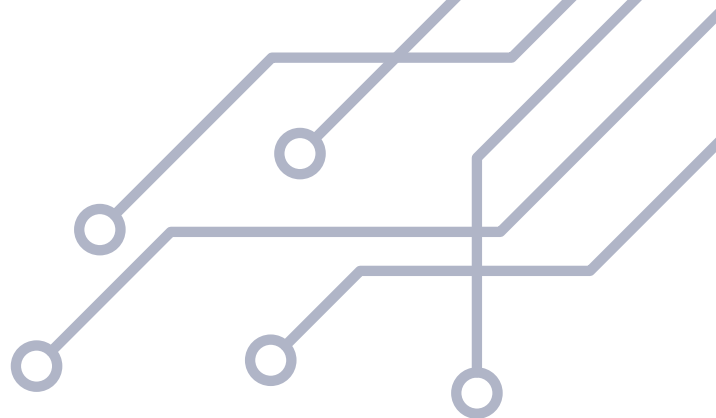# TECHNOLOGY AND INNOVATION IN EDUCATION AT THE WORLD BANK

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WORLD BANK GROUP

REIMAGINING HUMAN CONNECTIONS

TECHNOLOGY AND INNOVATION IN EDUCATION AT THE WORLD BANK

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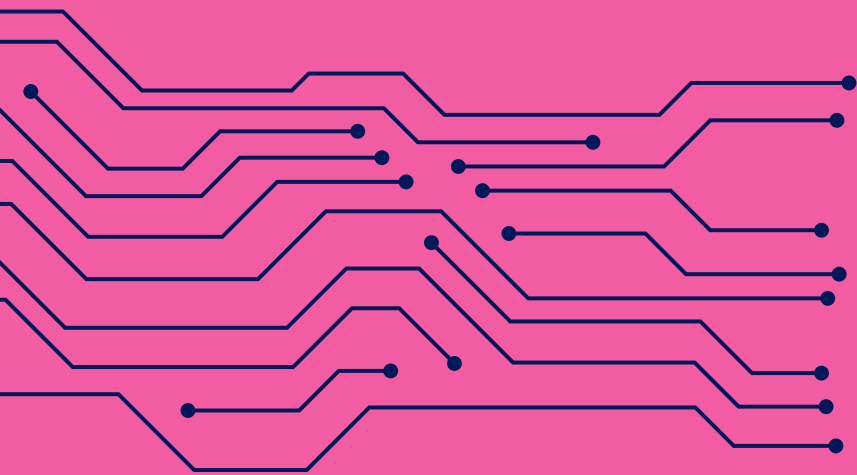
CONTENT

ACKNOWLEDGMENTS

EXECUTIVE SUMMARY

The world is in the midst of a technological revolution. Students are not being adequately prepared to thrive in this rapidly changing world.

Education systems, especially in low- and- middle-income countries, face many daunting challenges. 53% of 10-year old children in low- and middle-income countries cannot read and understand a short paragraph, a figure that rises to over 80% in the poorest countries. 258 million students are out of school, including 59 million children of primary-school age. The situation is even worse in communities afflicted by conflict and violence. Girls and children with special educational needs are particularly being left behind. This learning crisis has been exacerbated by the health and economic crisis of COVID-19 (in the most pessimistic scenario, COVID-19-related school closures could increase the rate of 10-year old children who cannot read and understand a short paragraph in the low- and middle-income countries by 10 percentage points, from 53% to 63%).

Education technology — or 'EdTech', the use of hardware, software, digital content, data, and information systems in education — supports and enriches teaching and learning and improves education management and delivery. EdTech can create new connections between teachers, students, parents, and broader communities to create learning networks. Investments in EdTech can make education systems more resilient to future shocks and help reform and reimagine the way education is delivered.

Education is, at its heart, about human connections.

The World Bank supports the appropriate, cost-effective use of EdTech at all levels of education and supports countries in expanding access and improving quality, both inside and out of the classroom – so that education reaches all students.

In pursuit of this goal, the World Bank works to **discover** evidence-based technology solutions in education; **deploy** solutions, at the pilot level and at scale; and **diffuse** this knowledge widely across policy makers and support capacity development to better use this new knowledge.

Education is, at its heart, about human connections — between students, teachers, parents, care-givers, principals, and broader communities. The COVID-19 crisis has exposed inadequacies and inequalities in access to education outside of school, limiting the quantity and quality of these connections.

Education policies and initiatives that utilize EdTech should embrace an inter-related set of five principles to maximize human engagement. The use of EdTech should be guided by a clear purpose and focus on educational objectives; reach all learners; empower teachers; engage an ecosystem of partners; and rigorously and routinely use data to learn what strategies, policies and programs are effective to maximize student learning.

The World Bank is committed to support countries in adopting digital technologies to improve teaching and learning, bringing education to ALL learners – anytime, anywhere.

FIVE PRINCIPLES

The World Bank advocates attention to five key principles when education systems invest in EdTech:

1. **ASK WHY:** EdTech policies and projects need to be developed with a clear purpose, strategy and vision of the desired educational change.

2. **DESIGN AND ACT AT SCALE, FOR ALL:** The design of EdTech initiatives should be flexible and user-centered, with an emphasis on equity and inclusion, in order to realize scale and sustainability *for all*.

3. **EMPOWER TEACHERS:** Technology should enhance teacher engagement with students through improved access to content, data and networks, helping teachers better support student learning.

4. **ENGAGE THE ECOSYSTEM:** Education systems should take a whole-of-government and multi-stakeholder approach to engage a broad set of actors to support student learning.

5. **BE DATA-DRIVEN:** Evidence-based decision making within cultures of learning and experimentation, enabled by EdTech, leads to more impactful, responsible and equitable uses of data.

OUR VISION

Reimagine Human Connections to
Transform Teaching and Learning for All

LEARN: THE CONTEXT AND THE CHALLENGE

A technological revolution and a learning crisis

The world is in the midst of a *technological revolution.* Industry after industry is being transformed and disrupted as a result of the emergence of new technologies and the business models and social practices they enable. More people are connected than ever before. Over half of the world's population has access to the Internet. Almost three-fourths of the world's poorest households have a mobile phone, more than have access to toilets or clean water. At the same time, stark inequalities persist related to the access to new technologies and the benefits of their use are not evenly distributed.

Too many students are not being adequately prepared to thrive in this rapidly changing world. Even before the outbreak of the COVID-19 pandemic in 2020 that led to widespread school closures in over 180 countries, the world was dealing with a l*earning crisis*. The World Bank estimates the levels of 'learning poverty' across the globe by measuring the number of 10-year old children who cannot read and understand a simple story. In low- and middle-income countries, this rate stands at 53%, while for the poorest countries, the figure rises to over 80%. 258 million students are out of school, including 59 million children of primary-school age. The situation is even worse in communities afflicted by conflict and violence. Girls and children with special educational needs are particularly being left behind.

EdTech is no longer a question of 'if' but rather of 'how'

Business as usual is not working

As a result of the spread of COVID-19, the education of 85% of children worldwide (over 1.6 billion students in total) was interrupted. This resulted in loss of learning in the short term; compounded over the long term, this will lead to diminished 'human capital' development and economic opportunities. Widespread school closures led many education systems to turn to 'remote learning' via radio, television, online and through the use of mobile devices, greatly accelerating a trend to use technology in education ('EdTech') at scale that had been underway for decades.

EdTech offers opportunities to reimagine education.

EdTech, the use of hardware, software, digital content, data, and information systems in education, by itself is not a panacea. Most investments in educational technologies to date in middle and low income countries have been related to improving *access* – to devices, to the Internet, and much less focus and attention has been directed to how exactly the use of these devices, and the approaches that they enable, are meant to impact teaching and learning processes in positive, meaningful ways. The impact of EdTech on student performance has therefore been mixed at best.

Today, the use of EdTech is no longer a question of 'if' but rather of 'how'. Beyond the immediate emergency response to deliver education to students out of school, COVID-19 compelled countries to re-examine their education models to address issues of resilience, access, quality and relevance with EdTech.

EdTech supports countries pursuing education reforms with regard to access, skills, teachers, assessment, content, data and community engagement:

Access: A major barrier to the effective use of EdTech is rampant inequality in access to technology infrastructure, which includes both devices (radios, TVs, computers, laptops, tablets, and phones) and connectivity to the Internet. This digital divide must be closed in order to realize the vision that learning should occur for all children, anywhere, anytime.

Skills: In addition to the digital divide in access to infrastructure, a second divide separates those with the skills to take advantage of EdTech, and those who can not. EdTech should be used not only to support basic literacy and numeracy, but also to help develop so-called '21st century skills', including socio-emotional as well as 'digital' skills, from basic technology competencies to higher order skills such as those related to coding, computational thinking and ethics.

Teachers: Education at its core is a social endeavor and teachers must be empowered to use technologies to engage students in learning. EdTech requires teachers to utilize new skills, competencies and pedagogical approaches, in addition to those that they traditionally employ. Related teacher support and training are essential. EdTech can enrich and scale up continuous professional development for teachers and school leaders through online learning tools and just-in-time, in-service coaching.
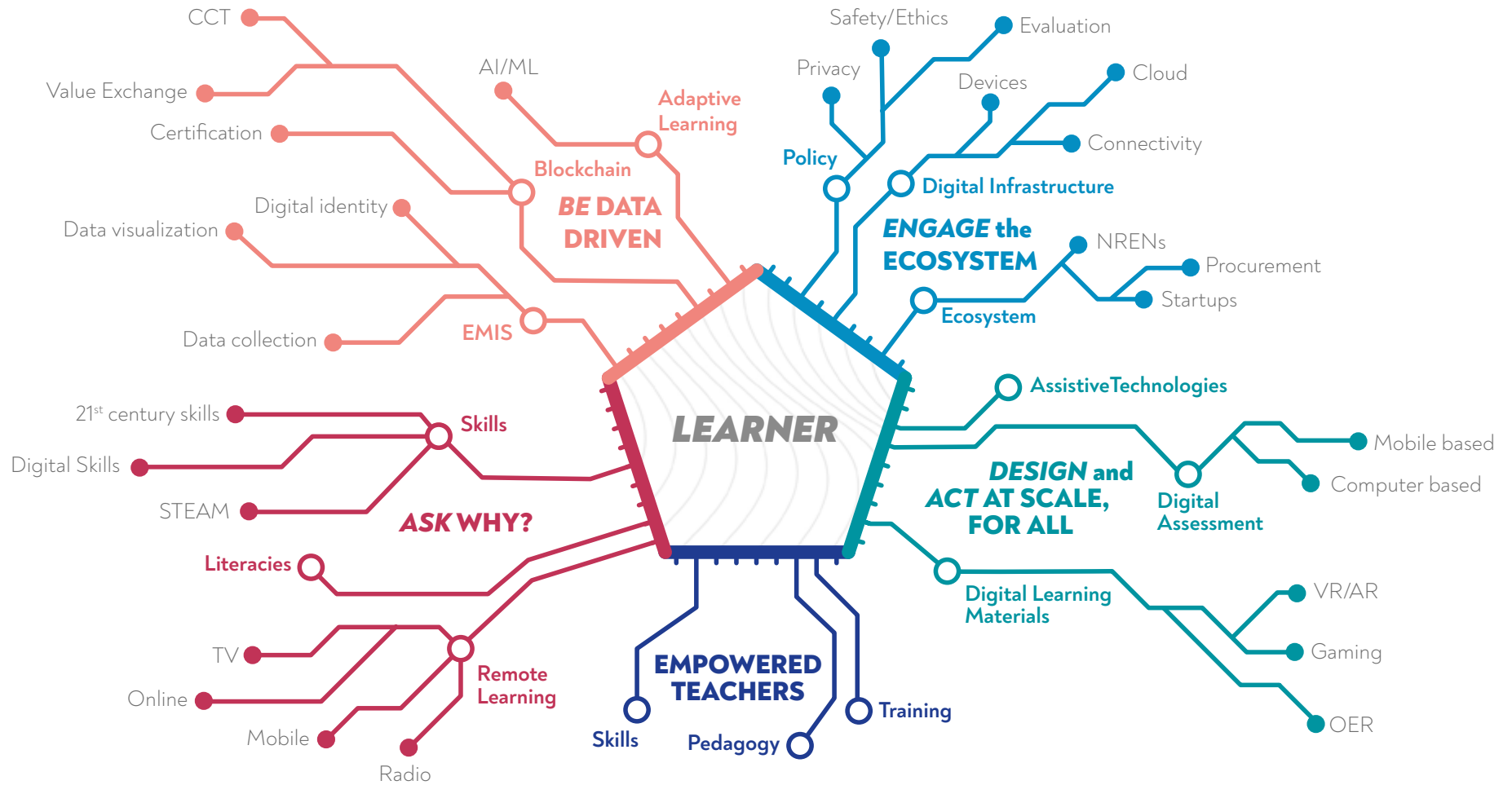
Content: Through digital learning materials of many sorts, EdTech can offer wider access to more engaging, relevant content to inspire and motivate learners and teachers. Whether through digital textbooks, digital simulations of scientific processes, educational games, the use of tools that allow for students and teachers to create and share their own content with others, open educational resources (OER), 'edutainment' or more cutting-edge technologies, EdTech can complement, extend and help reimagine traditional approaches to teaching, learning and assessment.

Assessment: EdTech can be integral to providing learners and teachers with better 'formative' assessments of how much students are learning on a daily, weekly or monthly basis, as well as with the types of high stakes, 'summative' assessments that are administered at scale by education systems to assign grades and determine promotion to higher levels. Artificial intelligence and machine learning algorithms can help to support the use of more adaptive, and in some cases, personalized learning assessments and opportunities.

Data: EdTech offers opportunities for more evidence-based and transparent decision making at the level of the learner, classroom, school and education system. Utilizing technology in support of teaching and learning leaves a 'digital footprint' that can be collected, analyzed and shared in ways that were simply not possible previously. Such use, however, carries with it profound implications related to privacy and data ownership, as well as challenges related to digital security.

Community engagement: EdTech can enable new connections between students, teachers, parents, and broader communities to create networks in support of learning, inside and outside the classroom, fostering greater and more diverse human engagement in teaching and learning processes.

Some of the interconnected and varied topics that the principles touch upon.

LEARNER

BE DATA DRIVEN
- CCT
- Value Exchange
- Certification
- Digital identity
- Data visualization
- Data collection
- EMIS
- AI/ML
- Blockchain
- Adaptive Learning

ENGAGE the ECOSYSTEM
- Safety/Ethics
- Privacy
- Policy
- Evaluation
- Devices
- Cloud
- Connectivity
- Digital Infrastructure
- Ecosystem
- NRENs
- Procurement
- Startups

ASK WHY?
- 21st century skills
- Digital Skills
- STEAM
- Skills
- Literacies
- TV
- Online
- Mobile
- Radio
- Remote Learning

DESIGN and ACT AT SCALE, FOR ALL
- AssistiveTechnologies
- Digital Assessment
- Mobile based
- Computer based
- Digital Learning Materials
- VR/AR
- Gaming
- OER

EMPOWERED TEACHERS
- Skills
- Pedagogy
- Training

EXPLORE:
FIVE ACTIONABLE EDTECH PRINCIPLES

ASK WHY:

EdTech policies and projects need to be developed with a clear purpose, strategy and vision of the desired educational change.

If technology is the answer, what is the question? Considerations of the use of education technology should focus on "education" and not just on the "technology". Before investing in and deploying EdTech, policymakers must ask what education challenges need to be addressed and what resulting change is desired. Policies must be holistic, taking into consideration teacher capacity and incentives, appropriate digital learning resources linked to curricula, and formative assessments that measure learning, among other issues. Education at its core is a human-centered, socially intensive endeavor that connects a community of learners. Technology should support and enable these connections.
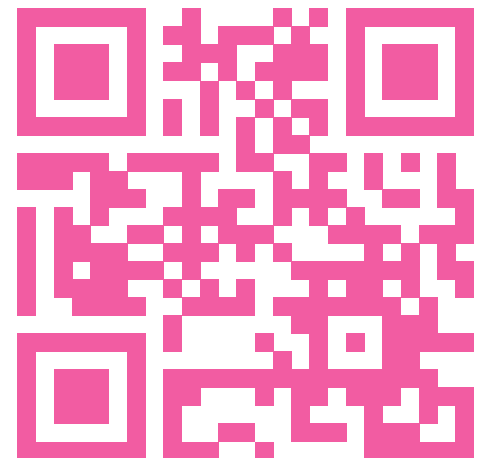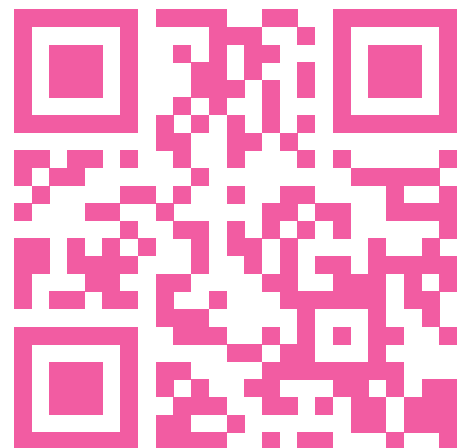
Scan QR code to learn more about "Ask Why"

DESIGN AND *ACT* AT SCALE, FOR ALL:

The design of EdTech initiatives should be flexible and user-centered, with an emphasis on equity and inclusion, in order to realize scale and sustainability for all.

In many places, the use of EdTech has exacerbated inequities in education systems. *This need not be the case.* Beginning the design process with considerations of how technology can be utilized *for all* will lead to initiatives that are more equitable and adaptable to specific contexts, and thereby sustainable *at scale.* Designing for scale begins with proactive engagement and empathy for all possible end-users and stakeholders — students, teachers, administrators, parents/caregivers, and others engaged in the educational process — in order to reveal different needs and contexts, including those related to gender, disabilities and cultural and linguistic diversity. Understanding these needs and contexts leads to more inclusive and flexible project designs.

Scan QR code to learn more about "Design and Act at Scale, For All"

EMPOWER TEACHERS:

Technology should enhance teacher engagement with students through improved access to content, data and networks, helping teachers better support student learning.

Evidence from around the world shows that, over time, the role of teachers become more central, and not peripheral, as the result of the effective use of EdTech. Technology will replace some of what teachers currently do, while at the same time supporting teachers as they take on new, often more sophisticated duties and responsibilities as a result of technological change. Teachers can be facilitators of learning, part of a learning team, a collaborator with outside expert mentors, a peer mentor to parents, and a team leader on a project-based learning activity, among other roles. At the same time, in those circumstances where there is a scarcity of teachers or where teachers are of 'low-capacity', technology can play an important role in assisting learners to, in part, overcome this deficit. Where teachers lack content or pedagogical knowledge, technology can support the use of structured lesson plans or text-based nudges to help build this capacity. Teachers' use of technology can empower them to leverage an array of resources to provide more focused, and in some cases more personalized, learning to students
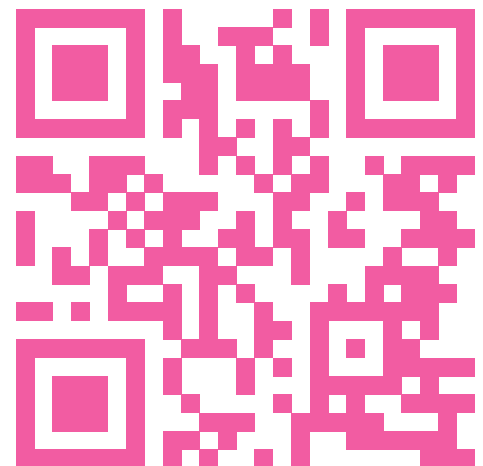
Scan QR code to learn more about "Empower Teachers"

ENGAGE THE ECOSYSTEM:

Education systems should take a whole-of-government and multi-stakeholder approach to engage a broad set of actors to support student learning.

Ministries of Education should engage, incentivize and leverage a wide and diverse set of stakeholders, inside and outside of the education system, when developing and implementing EdTech programs and policies. This ecosystem includes key stakeholders such as students, teachers, school leaders, parents/caregivers, NGOs, donor agencies, academia, and private sector companies, as well as other governmental agencies and authorities. Innovative digital educational content, software, applications, algorithms, 'edutainment' and edtech-enabled services are provided by many organizations – some local, some regional, and some global. Ministries of Education can't do it alone – and they shouldn't try to do so.

Scan QR code to learn more about "Engage the Ecosystem"

BE DATA-DRIVEN:

Evidence-based decision making within cultures of learning and experimentation, enabled by EdTech, leads to more impactful, responsible and equitable uses of data.

Education systems must prepare for an increasing abundance of data – along with the related opportunities and risks. This requires a commitment and capacity to utilize data and evidence to inform decisions to improve teaching, learning and the management of education systems. The promotion of open technology standards and prioritizing 'interoperability' (so that e.g. data can be shared across applications in ways that are efficient, appropriate and safe) can help avoid technology and vendor 'lock-in', where future decisions about the use of EdTech are constrained as a result of technology choices made in the past and by 'data silos' that don't talk to one another. Going forward, issues related to data privacy, ownership, usage and security will become more acute and clear policy guidance and rules need to be put in place, recognizing that decisions need to consider related trade-offs, and that related guidance and rules need to evolve over time. Iteration, controlled experimentation, and nimble evaluations are critical to creating cultures of learning that can help separate 'hope' from 'hype', informing future EdTech decisions.

Scan QR code to learn more about "Be Data-Driven"

www.worldbank.org/en/topic/edutech

IMAGINE: THE WORLD BANK EDTECH APPROACH IN ACTION

To operationalize these principles, the World Bank focuses on the discovery, deployment and diffusion of new technologies.

Discover, document, generate and analyze evidence-based technology solutions in education relevant to developing countries.
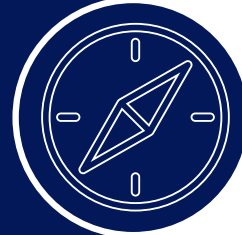
Deploy solutions, at the pilot level and at scale, tackling adoption barriers (including in procurement) and in ways that are informed by evidence and which allow for efficient course correction.
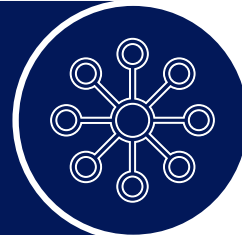
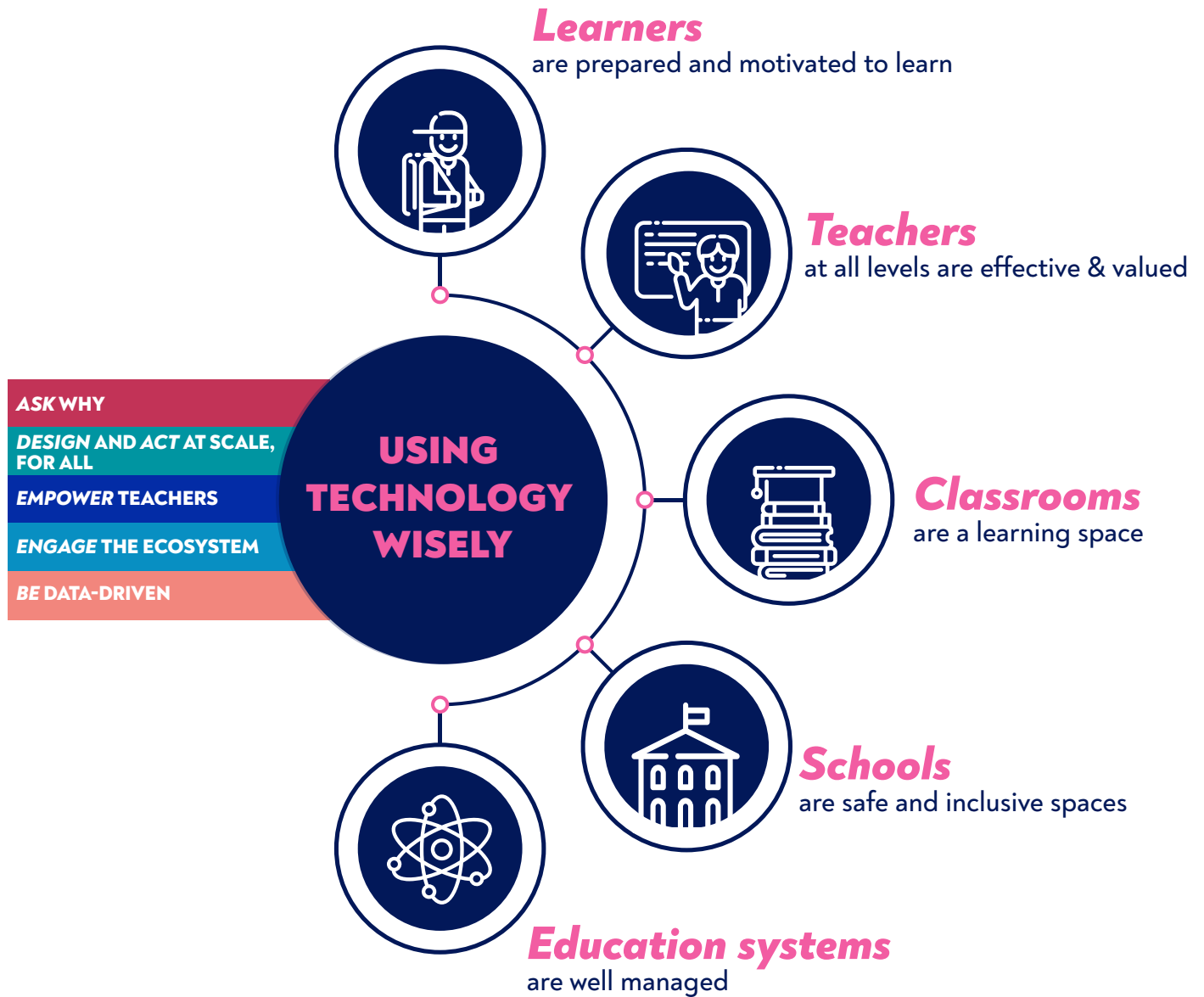**Diffuse** related knowledge widely across policy makers in our client countries and support capacity development to better use this new knowledge.
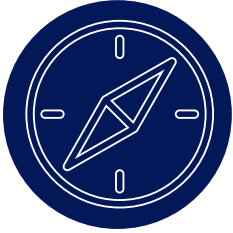
To execute this approach to EdTech, the World Bank provides support to countries through lending operations, technical assistance, partnership networks, and the development of digital 'global public goods' in support of its overall education strategy.

EdTech in support of the World Bank Education Approach

The World Bank approach to EdTech supports the World Bank's overall education strategy.

Learners
are prepared and motivated to learn

Teachers
at all levels are effective & valued

USING TECHNOLOGY WISELY

ASK WHY

DESIGN AND ACT AT SCALE, FOR ALL

EMPOWER TEACHERS

ENGAGE THE ECOSYSTEM

BE DATA-DRIVEN

Classrooms
are a learning space

Schools
are safe and inclusive spaces

Education systems
are well managed

Discover:

Identifying innovations and building the evidence base for EdTech

The World Bank supports education communities around the world to discover new innovations, build the evidence base and facilitate the transformation of Ministries of Education into learning organizations. Policy makers are supported to analyze their education systems as a whole, but act like entrepreneurs to make things happen. This is achieved through institutional support for monitoring and evaluation (M&E) in projects that use EdTech, partnerships with like-minded organizations and the development of digital 'global public goods' that can be used across multiple countries.

Scan QR code to learn more about identifying innovations and building the evidence base for EdTech
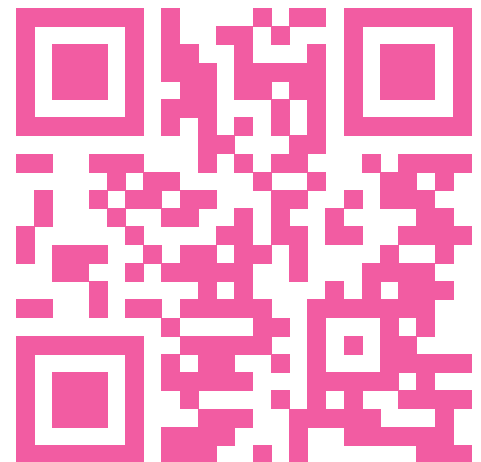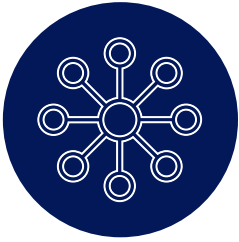
Deploy:

Projects, pilots and digital global public goods

The World Bank supports countries as they seek to strengthen and expand existing educational practices and approaches through the use of new technologies, as well as to transform them. The World Bank works with partners to develop 'digital global public goods' – research, digital resources and applications, databases and resource repositories, standards, algorithms and platforms – that are consistent with the five EdTech principles. Countries can build upon and adapt these 'digital global public goods' to their contexts. Through its US$17 billion portfolio (2020) of education projects, the World Bank supports EdTech initiatives that respond to the needs and demands of scores of countries around the world.
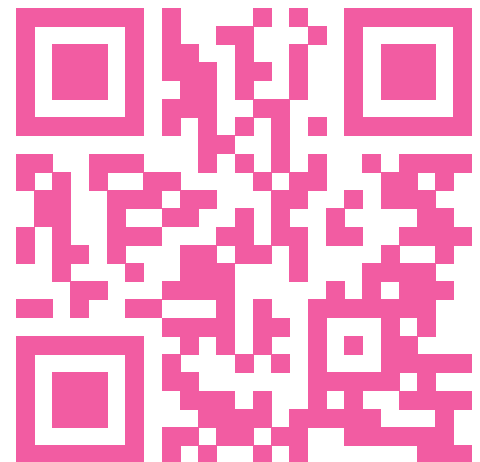
Scan QR code to learn more about projects, pilots and digital

Diffuse:

Capacity building networks and partnerships

The World Bank works in partnership with governments, academic institutions, non-governmental organizations, private companies, civil society and communities worldwide to support innovative projects, timely research, and knowledge-sharing about EdTech with the ultimate goal of improving teaching and learning. The World Bank recognizes the role played by the private sector and seeks to harness its innovations and ingenuity to strengthen efficiencies in the public sector. This approach of networking expertise is critical to ensure that EdTech experience is effectively shared across regions and borders and that last-mile support to educational institutions facilitates implementation of government programs. In addition, the World Bank engages in a range of both just-in-time and structured learning events for clients to share cutting-edge knowledge, promising practices and successful 'how-to' information in support of country programs.
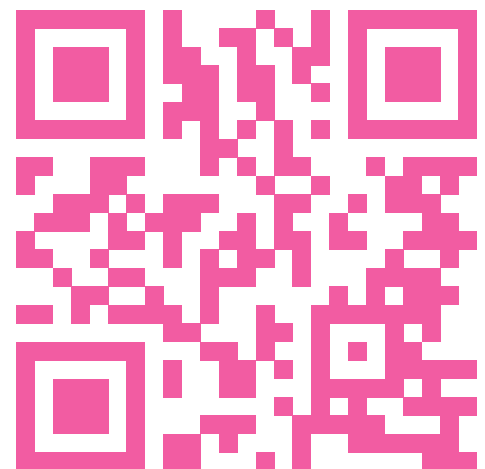
Scan the QR to learn more about capacity building, networks and partnerships

CONCLUSION: A ROADMAP TO GUIDE IMPLEMENTATION OF THE FIVE PRINCIPLES

Holistic Vision. EdTech policies need to be developed with an understanding of educational change to address the learning crisis. Policymakers should prioritize the kind of teaching and learning they want to develop, as well as the knowledge and skills students should exhibit.

Personalized Learning. EdTech needs to be designed according to the needs of the student, providing quality learning opportunities both in school and at home.

For All. By engaging the end-user and designing for inclusion, EdTech can support the rapid scaling of educational innovations both in the classroom and at the systems level.

Multi-channel Remote Learning. In order to reach all learners, governments should leverage a range of delivery channels, including radio, TV, mobile and online.

Digital Literacies. The digital divide in education goes beyond the issue of access to technology. A second digital divide that is harder to bridge separates those with the skills to benefit from use of technology from those without. A focus for teachers and students should be on the use of effective digital pedagogies, and not only use of technology.

Enable more **human engagement.** New technologies will replace some of what teachers currently do, thereby freeing them up to take on responsibilities with greater impact on student learning. While technology won't replace today's teachers, teachers who use technology will.

Whole-of-Government Approach. EdTech deployment requires ministries of education to engage with other government ministries, notably telecom and finance ministries, to review policies on reducing connectivity costs and increasing access for schools.

Don't Reinvent the Wheel. Education systems should learn from the mistakes of others – and not repeat them. Ministries of Education should actively identify ways to engage with, incentivize, integrate and sustain a broad set of actors in their country to contribute to the EdTech ecosystem in support of improved teaching and learning.

Open Standards and Architecture for Interoperability. The promotion of open technology standards and prioritizing 'interoperability', so that data can be shared across applications, systems and organizations in ways that are efficient, appropriate and safe, can help avoid technology and vendor 'lock-in' and help policymakers implement better decisions.

The Ministry of Education as a Learning Organization. Ministries of Education and their partners must be 'learning organizations', able to experiment so that iterative solutions can be explored, deployed and measured.

And finally: START. Accept that change is inevitable. Learning-by-doing, and making corrections as a result of what is learned, is required. No plan will be perfect. But the risks of inaction are greater than the risks of action. *Start.*

END NOTES/REFERENCES

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p.8 "258 million students"; "59 million children": UNESCO Institute for Statistics. (2019). Fact Sheet no. 56. New Methodology Shows that 258 Million Children, Adolescents and Youth Are Out of School. UNESCO.

A complete list of references, background reading and supplemental data are available on the World Bank EdTech web site: https://www.worldbank.org/en/topic/edutech/publication/reimagining-human-connections-technology-and-innovation-in-education-at-world-bank

Principles

Principle 1: Ask Why

Principle 2: Design and Act at Scale, For All

Principle 3: Empower Teachers

Principle 4: Engage the Ecosystem

Principle 5: Be Data-Driven

3Ds

Discover: Identifying innovations and building the evidence base for EdTech

Deploy: Projects, pilots and digital global public goods

Diffuse: Capacity building networks and partnerships

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