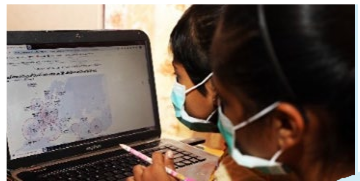






Journey Towards EdTech Adoption

How to successfully adopt and utilize EdTech to improve learning and development.

Jeffrey Xu, Senior Education Specialist, ADB

Arndt Husar, Senior Public Management Specialist (Digital Transformation) , ADB

Marc Lepage, Principal IT specialist (technology innovation) , ADB

ADB Roadmap for Successful EdTech Implementation

Why utilize EdTech?

Understanding the potential of EdTech

What evidence exist on EdTech efficacy?

What is EdTech?

What solutions are available?

What are your improvement areas in **Teaching & Learning**, **Governance**, and **Employability** processes?

Where do you stand?

Assessing Digital Education Readiness

Is the Infrastructure, Government, Schools, Learners, and local EdTech Providers ready for transformation?

How to utilize EdTech?

Forming strategies for implementation

How to plan, prioritize, and implement EdTech solutions?

ADB Roadmap for Successful EdTech Implementation

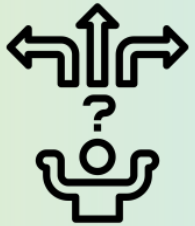
Exploring existing evidence on EdTech efficacy helps to form implementation strategy.

EdTech Efficacy: Learnings From The Best-Quality Meta-Analyses

Technological interventions increase learning — but sustainable impact exists only if they enhance the teacher-learner relationships

*"The presence of technology is of **benefit to student achievement**. This benefit extends from elementary to graduate school education."*

*"The most essential finding is the importance of **various pedagogical aspects of technology use** and the importance of teacher training to use technology."*



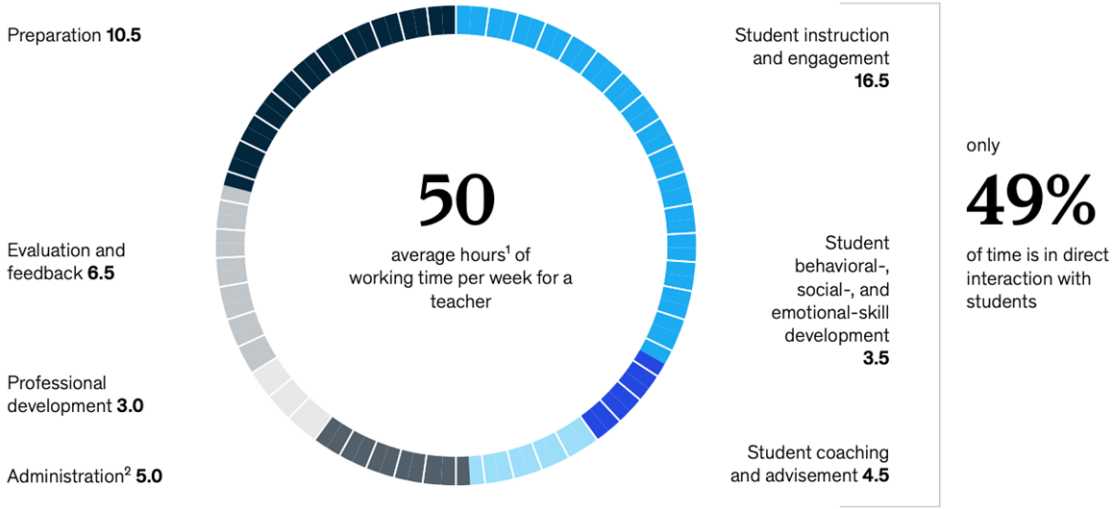
*"**The moderate use of technology** has been shown to outweigh technology applications featuring "all of the bells and whistles"*

Source: Gauging the Effectiveness of Educational Technology Integration in Education: What the Best-Quality Meta-Analyses Tell Us

Exhibit 1

Teachers work about 50 hours a week, spending less than half of the time in direct interaction with students.

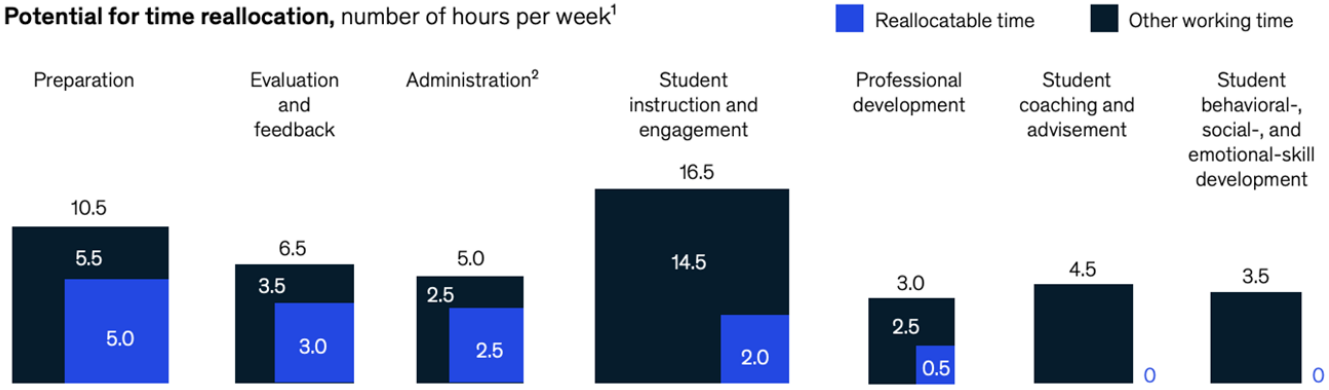
Activity composition of teacher working hours, number of hours



[1] 1 Average for respondents in Canada, Singapore, United Kingdom, and United States.
[2] Includes a small "other" category.
Source: McKinsey Global Teacher and Student Survey

Exhibit 2

Technology can help teachers reallocate 20 to 30 percent of their time toward activities that support student learning.



[1] Figures may not sum, because of rounding. Average for respondents in Canada, Singapore, United Kingdom, and United States.
[2] Includes a small "other" category.
Source: McKinsey Global Teacher and Student Survey

ADB Roadmap for Successful EdTech Implementation

Education Technology *is the combined use of computer hardware, software, and educational theory and practice to facilitate learning.*

What is EdTech?

EdTech is rapidly growing industry that has the power to **transform education** for good.

EdTech Product Taxonomy

What solutions exist in the market that help transform education?

EdTech Product Landscape

Products can be divided in three different categories based on their purpose of use

The product taxonomy helps to understand what type of solutions are being deployed in ADB member countries.

Teaching & Learning

- **1. Learning Content**
  - Self-directed learning
  - Classroom learning
- **2. Learning Activities**
  - Learning Engagement tools
  - LMS
  - Teacher empowerment
- **3. Learning Assessment**
  - Continuous assessment
  - Summative assessment

Administration & Governance

- **1. Data Integration & Analytics**
  - Data interoperability
  - Learning analytics
- **2.Management Systems**
  - People management
  - Resource management
  - Communication

Employability

- **1. Upskilling & Reskilling**
  - Self-directed learning
  - Institutional
- **2. Skills Qualification**
  - Assessment
  - Credentialing
- **3. Career Planning**
  - Data-informed decision
  - Mentoring / guidance


EdTech for
Teaching &
Learning
ADB

EdTech for Teaching & Learning

Teaching & Learning

Teaching & Learning products are used for lesson preparation, assessment, and student instruction and engagement.

1. Learning Content Solutions

- **Classroom learning tools**
- **Self-directed learning tools**

These solutions support learning through ready made content. It **liberates educators' time from preparation**, helps students to improve understanding, and allows **self-directed learning**.

Benefits include:

- Interactive learning
- Immersive & informative visuals
- Personalised learning paths

2. Learning Activities Solutions

- **Learning Engagement tools**
- **Learning Management Systems**
- **Professional development**

These solutions allow the **creation** of learning **content** and **activities** and help educators to **improve** their **pedagogy**.

Benefits include:

- Active & inclusive learning
- Student centered
- Improved pedagogy
- Real-time feedback

3. Learning Assessment Solutions

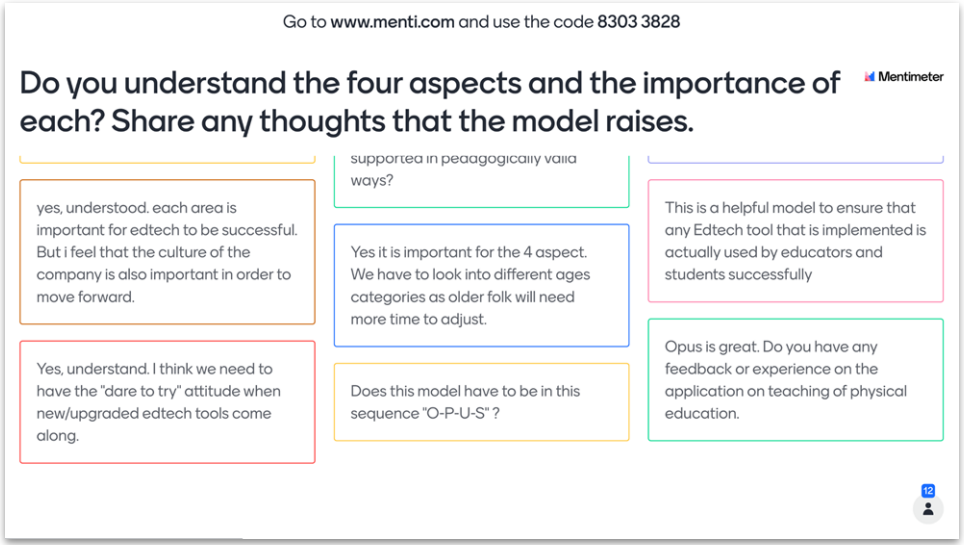
- **Continuous Assessment**
- **Summative Assessment**

EdTech solutions that allow **formative** and **summative** assessment and enriched feedback for students.

Benefits include:

- Efficiency; assessment templates
- Objectivity
- Transparency
- Diversity of assessment methods and feedback

How Can Technology Improve Teaching & Learning?



Making learning more interactive

Meta-analysis of 23 high-quality empirical publications show that interactive whiteboard-based instructions can positively influence students' cognitive learning outcomes compared to traditional lectures. (Y. Shi, et al. 2019)

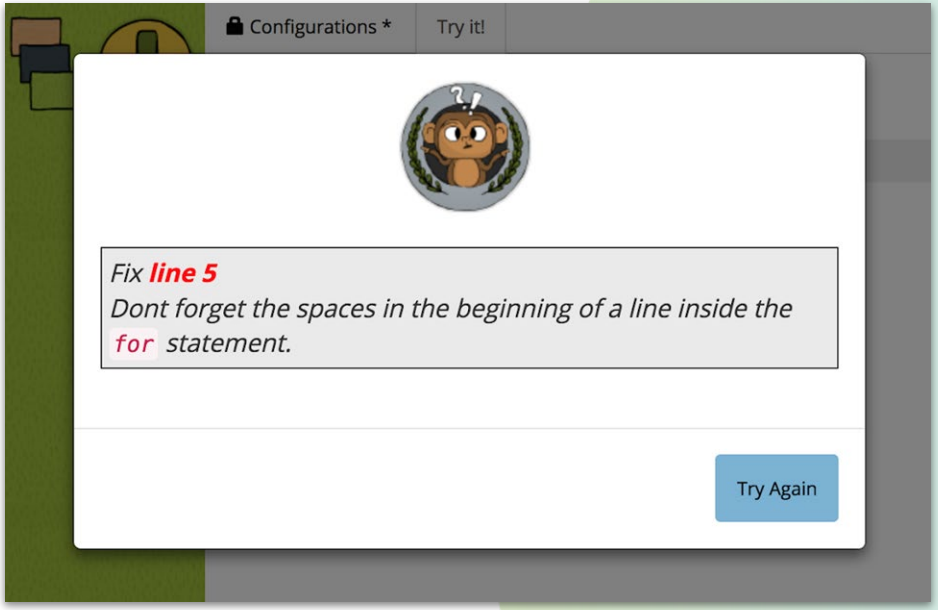
There exists a vast variety of EdTech solutions that allow educators to make learning more interactive through online ideas sharing, polls, quizzes, and questions during a lesson or lecture.

How Can Technology Improve Teaching & Learning?

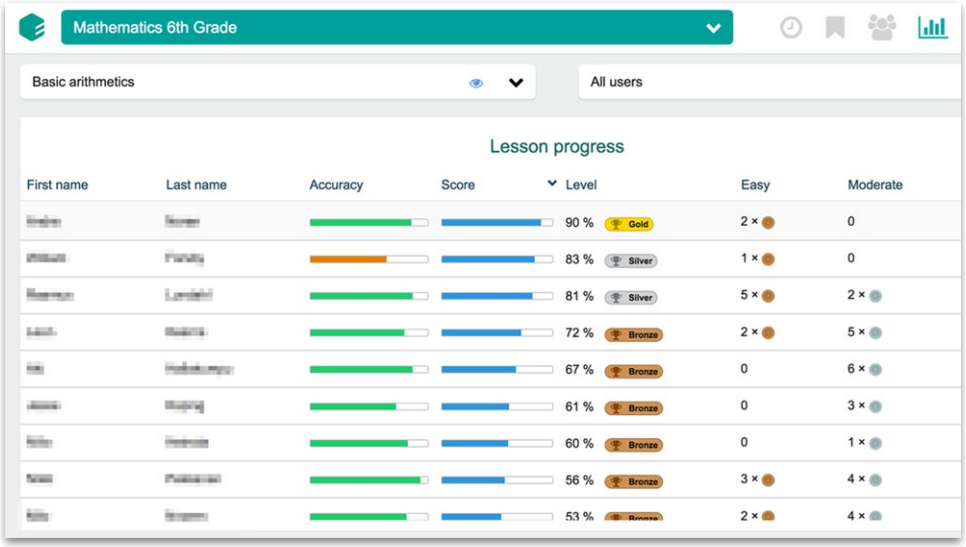
Automating guiding feedback and learner-centered pedagogy

Providing guiding feedback for learners is one of the main tasks for educators. According to Irons (2007), the effectiveness of feedback on learning decreases as the response time increases.

EdTech allows automated feedback which can mitigate this issue of long response time by offering learners the opportunity to monitor and regulate their own performance. In doing so, students' intrinsic motivation to complete the task increases, and their confidence to progress is boosted (Schaap, 2011).



How Can Technology Improve Teaching & Learning?



Collecting data & analytics and enabling adaptivity

Meta-analysis of 16 randomised controlled trials in five countries reveals that technology-supported personalised learning was found to have a statistically significant positive effect on learning.

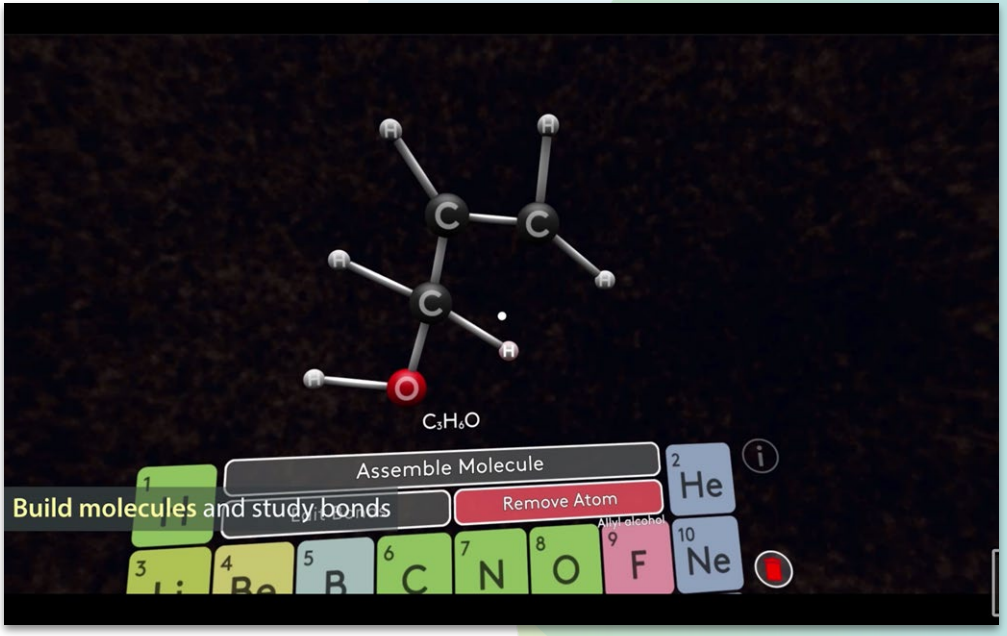
More personalised approaches which adapt or adjust to learners' level led to significantly greater impact than those only linking to learners' interests or providing personalised feedback, support, and/or assessment. (Robert M. Bernard et al., 2018)

How Can Technology Improve Teaching & Learning?

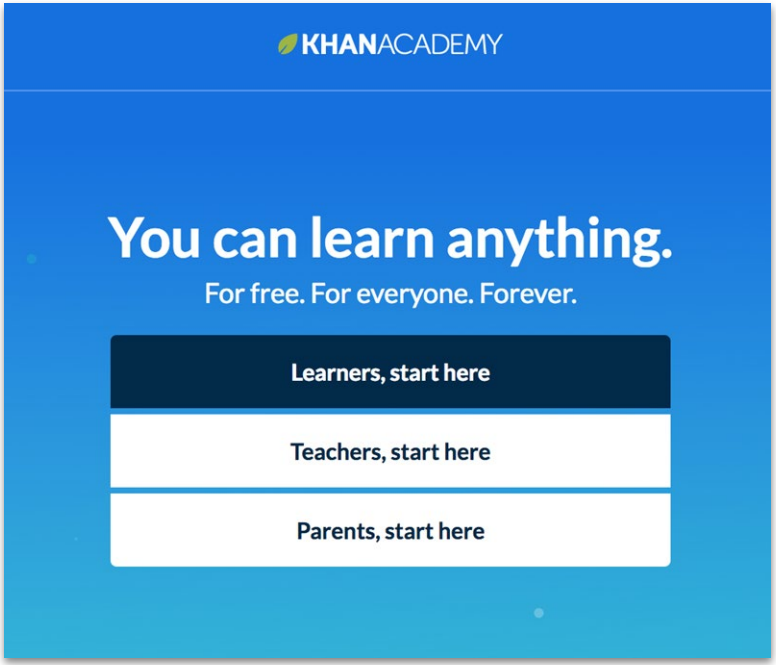
Offering dynamic visualization

Meaningful learning requires conceptual understanding rather than memorization. The knowledge need to be constructed by the learner, not only be transmitted from the teacher to the students (Jonassen, et al., 1999).

Dynamic visualizations and simulations help students to form conceptual understanding in all subjects. A significant amount of research has demonstrated the effectiveness of EdTech simulations in student learning (Widiyatmoko, 2018). Simulations in AR and VR offer immersive virtual environments to ensure learning engagement.



How Can Technology Improve Teaching & Learning?



Allowing remote access to content, instructions and teaching

Open educational resources (OER) represent online materials that are offered to the general public. These materials can include online courses (MOOCs), video-based instruction, textbooks, or any resource that gives access to knowledge.

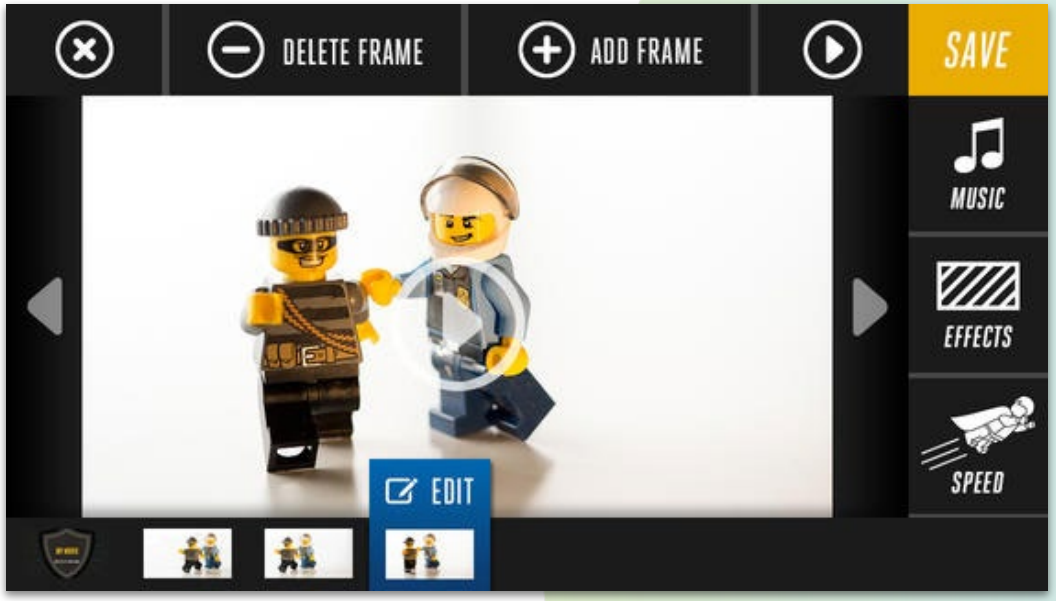
Online resources are usually more successful as a supplement instead of replacement. Supplemental use of online materials is called blended learning. Research suggests significant and positive relationship between blended learning programs, intrinsic motivation, self-efficacy, and academic achievements. (Siddiqui et al., 2020)

How Can Technology Improve Teaching & Learning?

Enabling creative production and online collaboration

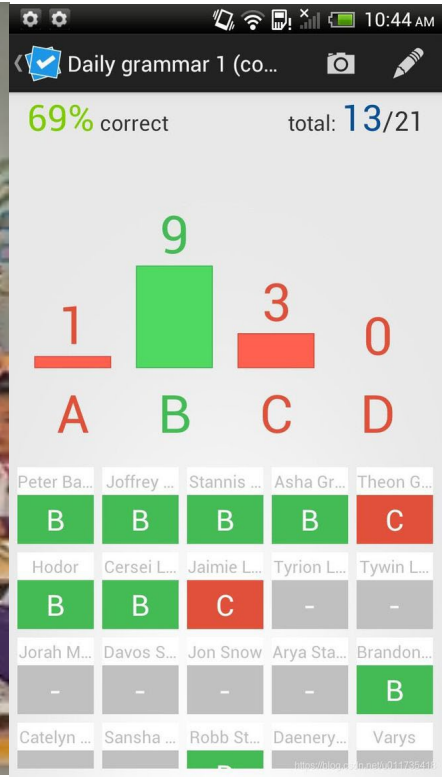
Creativity is the driver of innovation, which is the key to development and social change, as well as economic growth (Maier et al., 2013).

In the current context of the digital age, ICT is considered a tool to promote creativity, develop it, expand it and even democratise it. The appropriate use of ICT can improve communication, collaborative work, generation of ideas, and fostering problem solving. EdTech can also encourage reflective and critical thinking which are essential components for creativity's development.



New Interactive Classrooms – Low Tech Approach

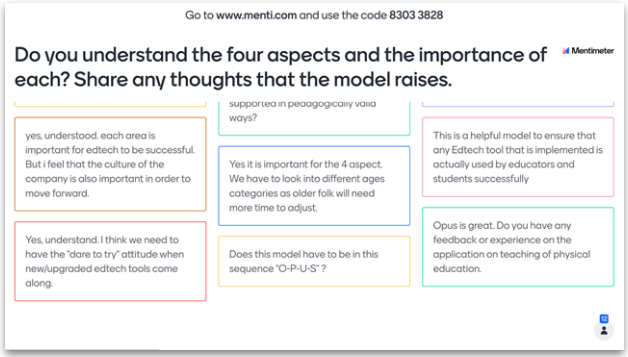
In-class student learning outcome data with a simple smartphone used in over 100 countries



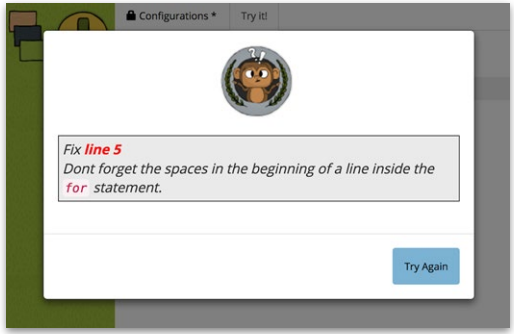
Cost Effective Formative Assessment

In-class student learning outcome data with a 5-dollar clicker assigned to each student – Speech recognition empowered - Used with over 10 million students in China

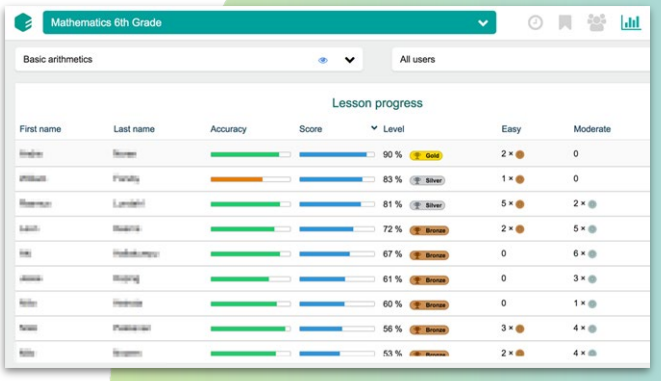
How Can Technology Improve Teaching & Learning?



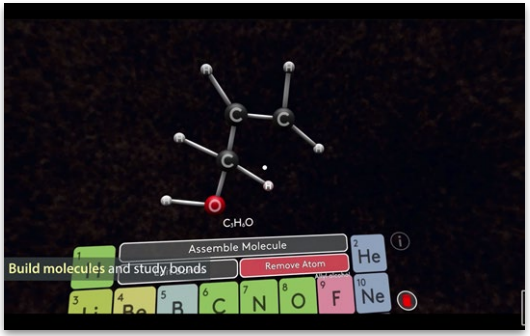
[Making learning more interactive]



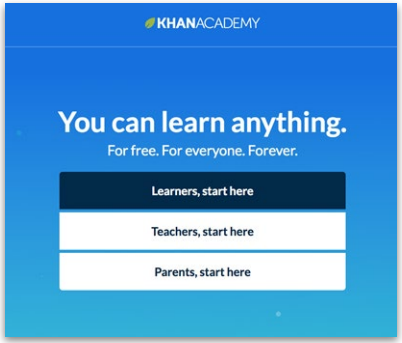
[Automating guiding feedback]



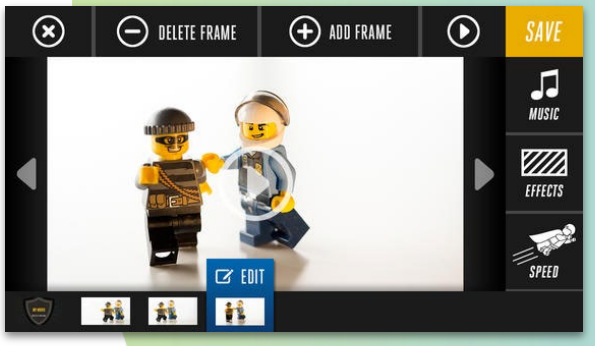
[Learning analytics & enabling adaptivity]



[Offering dynamic visualization]



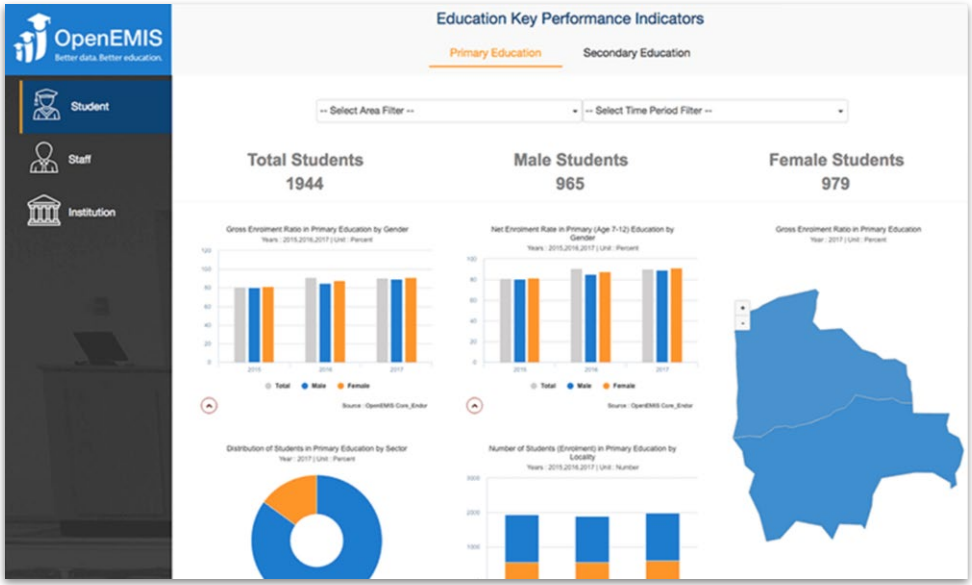
[Allowing remote access to content, instructions and teaching]



[Enabling creative production and online collaboration]

EdTech for **Administration & Governance**

How Can Technology Improve Education Administration?



Education Management Information Systems to collect, analyze, and report data

EMIS systems allow efficient management of educational activities.

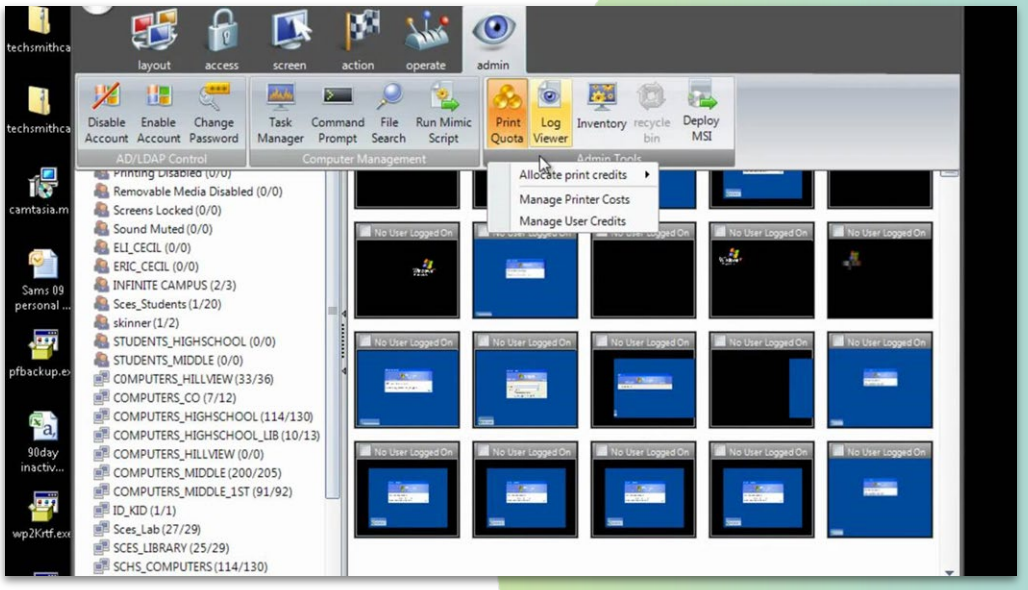
Several studies have been conducted to measure the impact of EMIS systems in school management processes. According to research findings there has been seen an increase in employee performance, better decision making and superior organization's goal achievement. Thus, EMIS systems have been proven to be useful to the education sector to improve effectiveness and efficiency. (Viveiros, A., Reyes, J., Cole, D., & Laing, J., 2019)

How Can Technology Improve Education Administration?

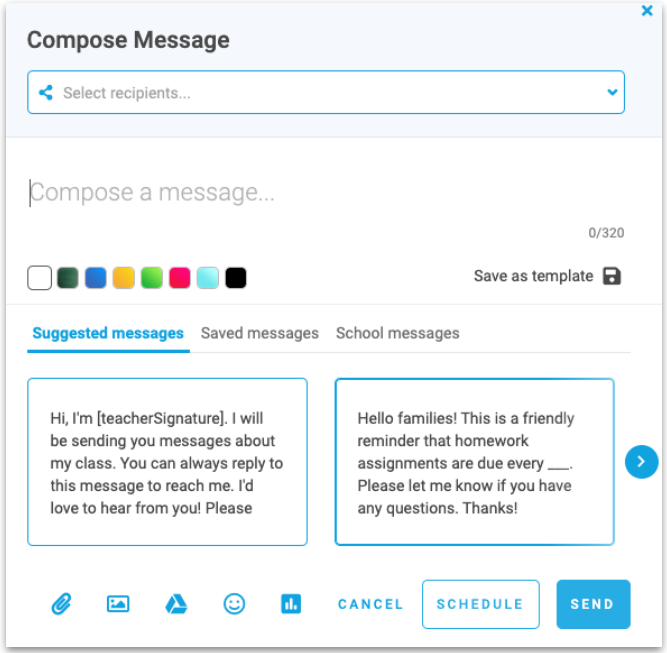
Resource Management to Enable Effective Use of Devices and Facilities

The aim of education ERP implementation is to provide colleges, schools and departments, with an enhanced ability for teaching and research at reasonable or low cost. (Watson, E. and H. Schneider 1999) One of the key benefits of ERP solutions is that they offer improved access to accurate and timely information.

Research indicates that benefits from the ERP systems will be achieved not through autocratic leadership but through the executive driving a common vision and empowering Staff. (McConachie, J., 2004).



How Can Technology Improve Education Administration?

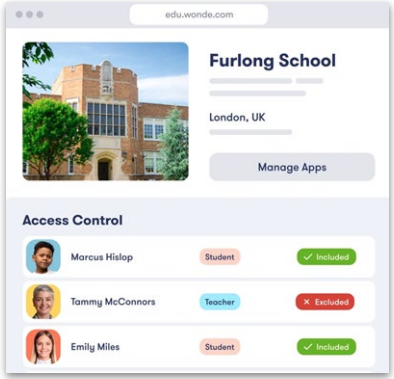


Communication between educators, learners, school staff and parents

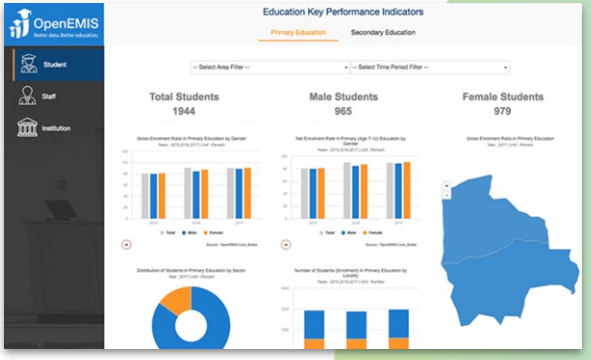
Meta-analysis of 11 research articles (Stratigos, T., & Fenech, M., 2021) on pedagogical documentation and communication applications support potential benefits for parent engagement and pedagogy.

Educators report that the apps allow documentation at a time and location that suits them and easily sharing with extended families, whereas parents enjoy receiving notifications of posts and immediate access to information about their child's experiences. (Higgins & Cherrington, 2017; Penman, 2014)

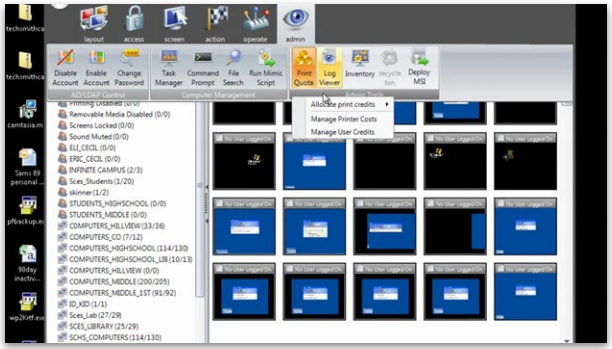
How Can Technology Improve Education Governance?



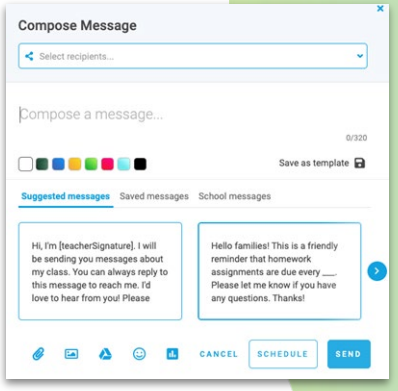
Data management to allow easy access, data interoperability and privacy



Education Management Information Systems to collect, analyze, and report data



Resource Management to Enable Effective Use of Devices and Facilities



Communication between staff, learners and stakeholders

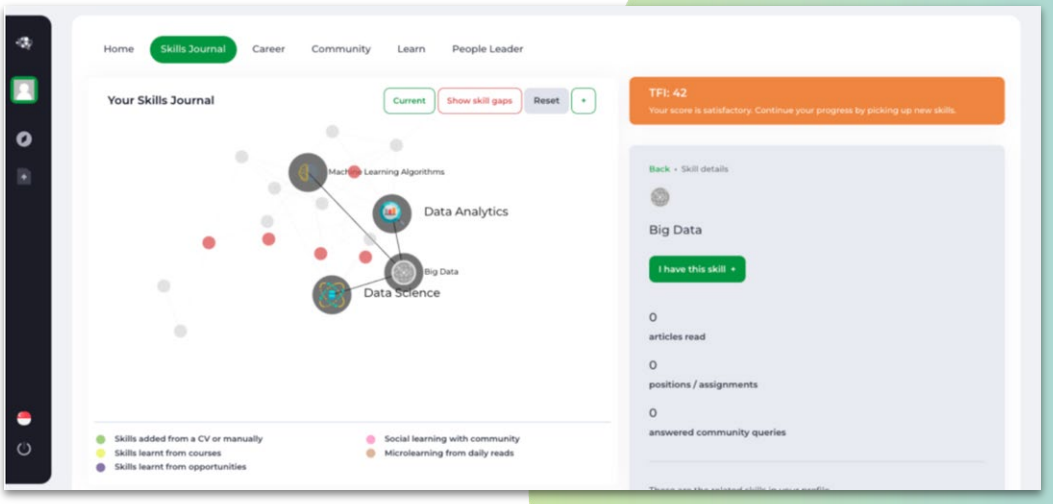

ADB
EdTech for
Employability &
Entrepreneurship

How Can Technology Improve Employability?

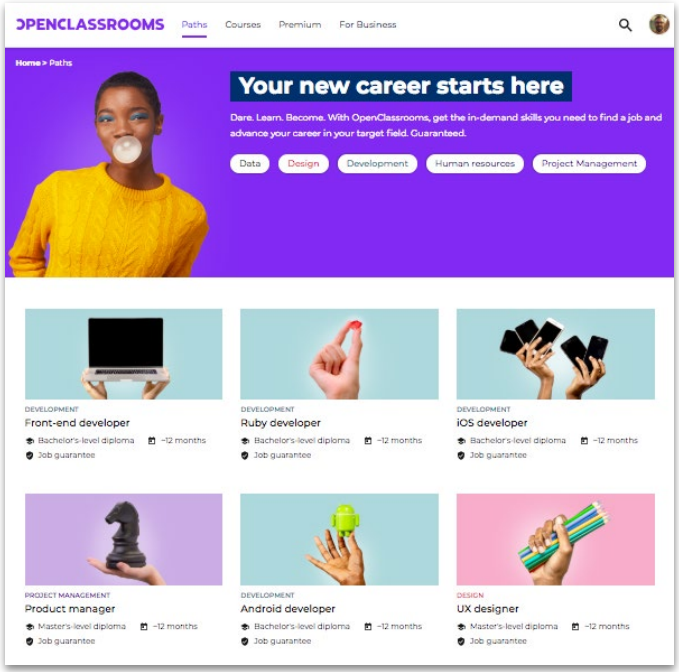
Enhancing career planning through data utilization, assessments, learning plans

Higher education career services have adopted employability EdTech to streamline processes, collect data, provide career and employability information resources (Knight, E., Staunton, T., & Healy, M. 2022).

A variety of EdTech solutions exist to help students plan own career paths through understanding better the job-market needs and what skills they'd need to gain in order to be recruited.



How Can Technology Improve Employability?



Reskilling and upskilling to meet the needs of job-market

Upskilling & reskilling platforms are used by learners to integrate skills acquired throughout the workforce lifecycle. Students can use the platforms to supplement coursework, to access offerings otherwise unavailable to them, and to prepare for the transition from academia to employment.

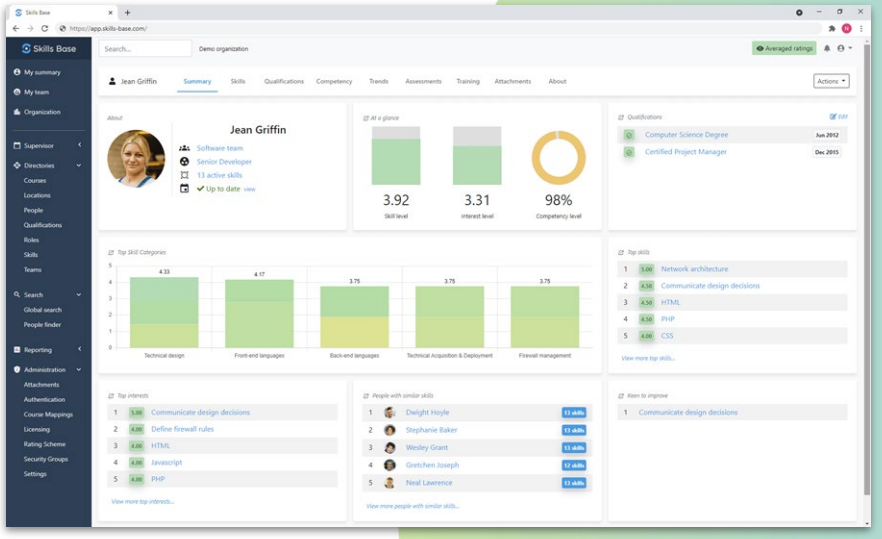
Adult learners can use upskilling platforms on the job as part of a corporate learning and development program, in parallel to their work or job search to prevent skills erosion, and to stay relevant in the job market. (Lands, A., & Pasha, C. 2021)

How Can Technology Improve Employability?

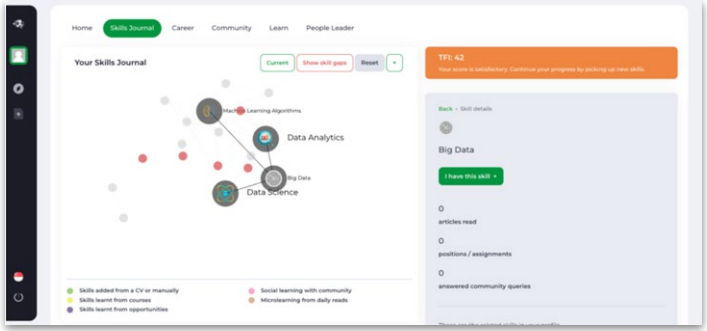
Measuring & verifying job-skills and competencies

Artificial intelligence is leveraged for HR processes, effective recruitment and selection processes (Jha, S. K., Jha, S., & Gupta, M. K. (2020). Learners themselves can also get assessed and prove their competencies through online skills assessments or digital work experiences.

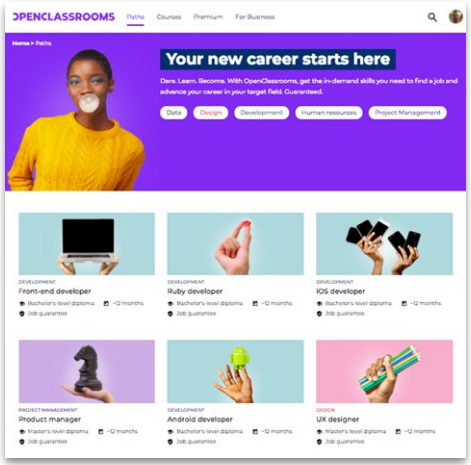
Remote assessments can streamline recruitment processes and lower the threshold for employees to gain understanding of the relevancy of own professional competencies in the job market.



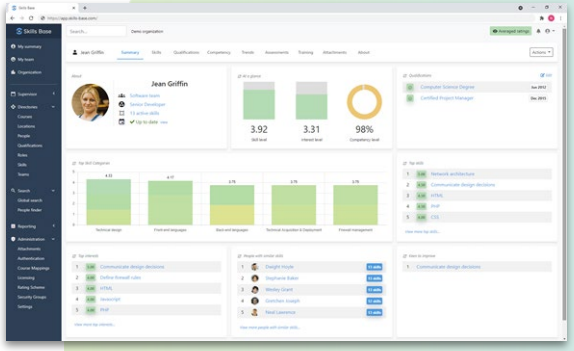
How Can Technology Improve Efficiency in Employability?



Gaining knowledge and insights for career decision making



Learning & accreditation through working in real projects



Measuring and verifying job-skills and competencies.

EdTech Product Landscape

Products can be divided in three different categories based on their purpose of use

The product taxonomy helps to understand what type of solutions are being deployed in ADB member countries.

Teaching & Learning

- **1. Learning Content**
  - Self-directed learning
  - Classroom learning
- **2. Learning Activities**
  - Learning Engagement tools
  - LMS
  - Teacher empowerment
- **3. Learning Assessment**
  - Continuous assessment
  - Summative assessment

Administration & Governance

- **1. Data Integration & Analytics**
  - Data interoperability
  - Learning analytics
- **2.Management Systems**
  - People management
  - Resource management
  - Communication

Employability

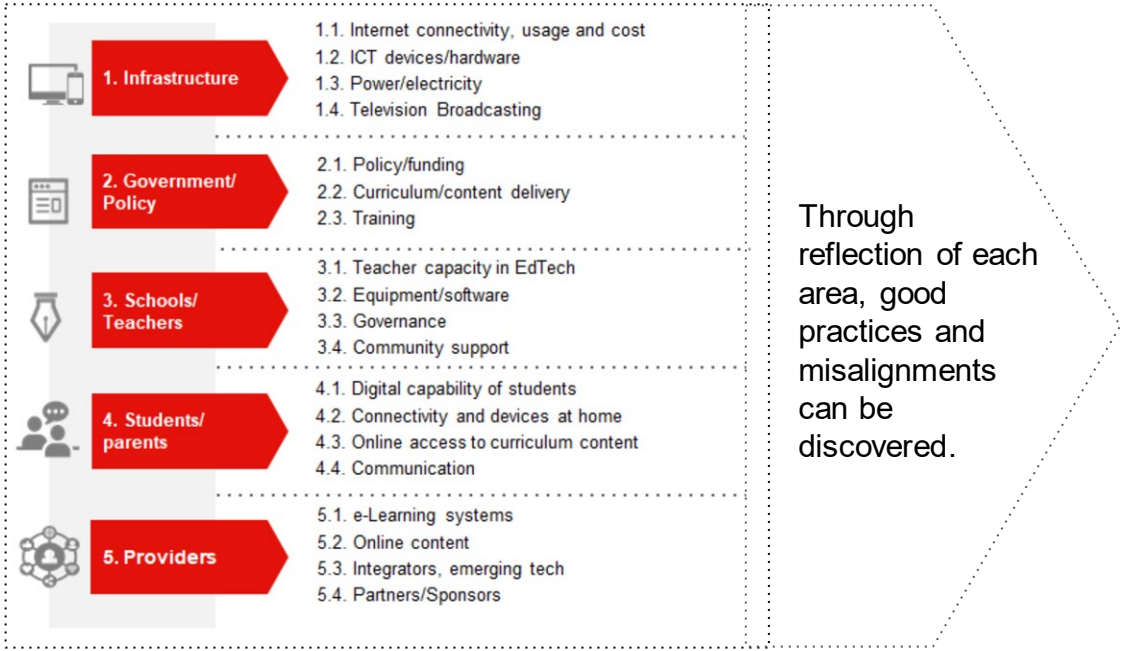
- **1. Upskilling & Reskilling**
  - Self-directed learning
  - Institutional
- **2. Skills Qualification**
  - Assessment
  - Credentialing
- **3. Career Planning**
  - Data-informed decision
  - Mentoring / guidance

ADB Roadmap for Successful EdTech Implementation

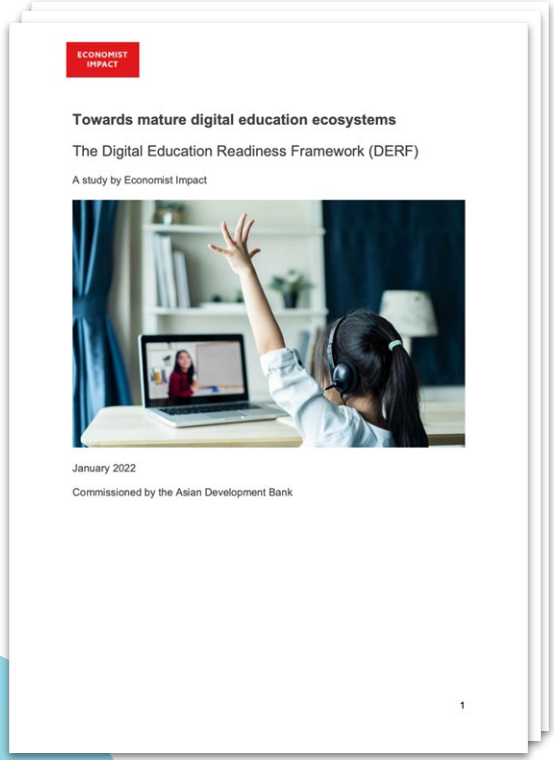
Where are the countries' gaps in capitalizing opportunities for digital education?

How To Use EdTech?

The gathered best practices are construed through five pillars that are critical for successful utilization of EdTech. The five pillars are based on Digital Education Readiness Framework.



What is DERF - Digital Education Readiness Framework?

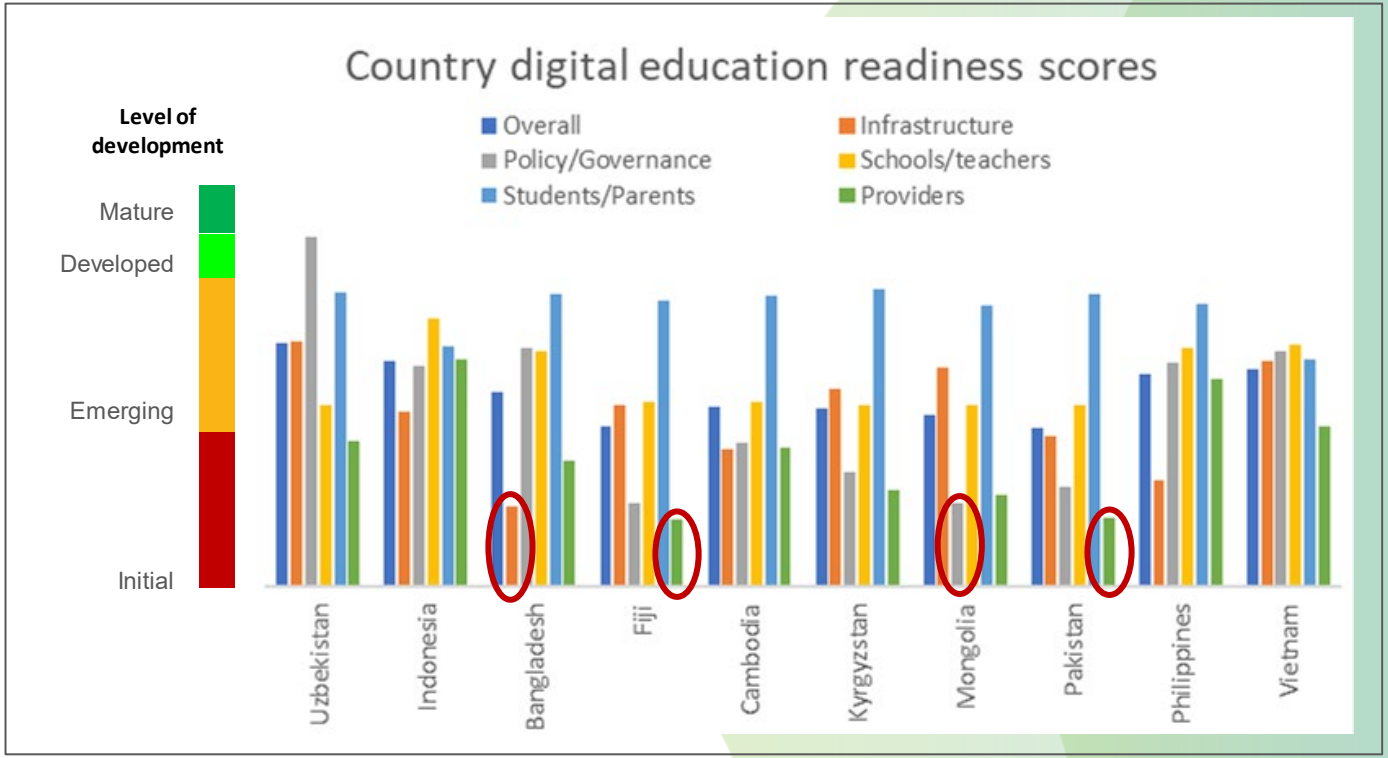


DERF offers a holistic framework to assess **readiness for the delivery of education via digital technology** at the country level and has collected data in 10 DMCs to illuminate country-level strengths and weaknesses in readiness.

Through rigorous evaluation of country's digital education readiness valuable information can be gathered to guide the digital transformation strategy.

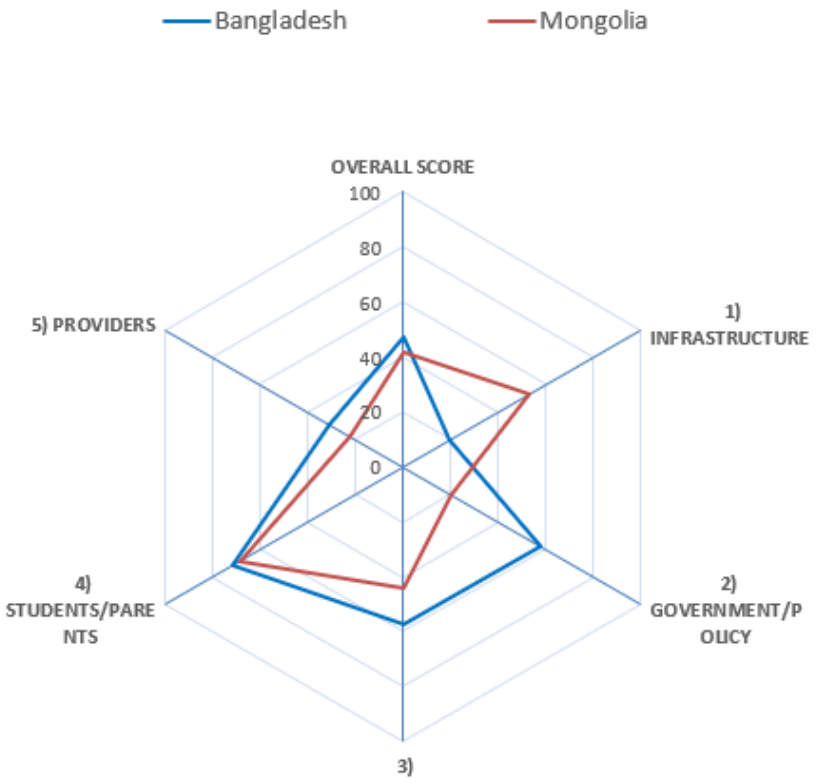
The Digital Education Readiness Framework (DERF) has been jointly developed by ADB & Economist Impact.

Digital Education Readiness of Countries



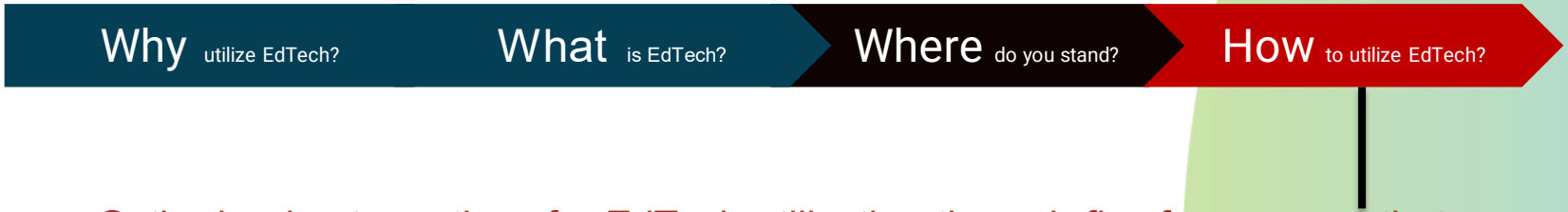
Source: ADB Digital Education Readiness Framework (DERF).

Gaps in Digital Education Readiness of Countries



Source: ADB Digital Education Readiness Framework (DERF)

ADB Roadmap for Successful EdTech Implementation



Gathering best practices for EdTech utilization through five focus areas that are based on Digital Education Readiness framework. Each area is reflected from the viewpoint of what are the existing challenges and opportunities.

1. Infrastructure
2. Governance
3. Schools/Teachers
4. Students/Parents
5. EdTech Providers

How to use EdTech?

1. Infrastructure

- Internet Connectivity, usage and cost
- ICT Devices/hardware
- Power/electricity
- Emerging Technologies

Low-, Medium-, & High Tech Infrastructure

Readiness to utilize digital learning solutions vary between schools and education systems. During global school closures, remote learning activities took place. Depending on the level of country's technological infrastructure, the remote learning practices varied heavily.

We categorise the infrastructure in three levels:

- Low Tech
- Medium Tech
- High Tech

Effective digital learning – High Tech

Distance Learning – Low Tech

Distance Learning – Medium Tech

Challenges: Internet Connectivity

Fight for better signals

Photos: https://hotindiareport.com/india/scaling-new-heights-to-attend-online-classes/; UZB Google pictures

Meaningful Connectivity at School

Giga has set a minimum target for meaningful connectivity...

2024 target

Level of detail

20 Mbps per school

In short:

- Giga's view on meaningful connectivity is to deliver a minimum of 10 Mbps per school, but Giga will advise on a target for 20 Mbps per school where reasonable

20 Mbps per school
1 Mbps per 20 students
Monthly minimum of 100 GB

Nuanced:

- For larger schools, 1Mbps / 20 students is the target. This means ~15 Mbps for an average sized school of ~300 students
- The monthly minimum on data is 100 GB. Giga will advise on a target of 200 GB per month

20 Mbps per school
1 Mbps per 20 students
Monthly minimum of 100 GB
Download speed of 20 Mbps
Upload speed of 5 Mbps

In detail:

- Giga's minimum download speed for meaningful connection is 10 Mbps with an upload speed of 2.5 Mbps. As a target, Giga will advise for double the minimum download and upload speed

...which translates into certain technology options

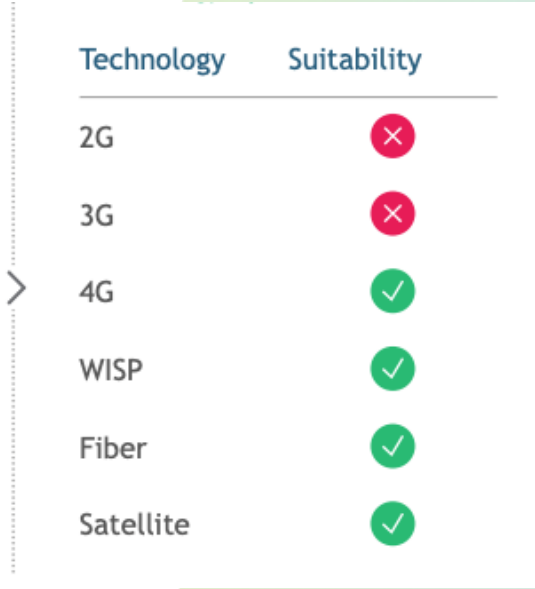
Technology	Suitability
2G	✗
3G	✗
4G	✓
WISP	✓
Fiber	✓
Satellite	✓

Source: BCG, Country Operating Models for School Connectivity

Meaningful Connectivity

Activity	Broadband speeds
Taking an online class	0.25 Mbit/s
Searching the web	1 Mbit/s
Checking e-mail	0.5 to 1 Mbit/s
Downloading digital instructional materials, including open educational resources	1 Mbit/s
Engaging with social media	0.03 Mbit/s
Completing multiple choice assessments	0.06 Mbit/s
Music streaming	2 Mbit/s
Video streaming – standard definition quality	3 Mbit/s
Video streaming – HD quality	5 Mbit/s
Video streaming – Ultra HD quality	25 Mbit/s
Streaming HD video or a university lecture	4 Mbit/s
Watching a video conference	1 Mbit/s
Participating in HD videoconferencing	4 Mbit/s
Participating in a video conference	1 Mbit/s per user
Engaging with a simulation and gaming	1 Mbit/s
Engaging in two-way online gaming	4 Mbit/s

Source: adapted from State Educational Technology Directors Association



Satellite Connectivity

Population density: for sparsely populated areas (less than 60 inhabitants per km^2) satellite is the least costly & least complex method of delivering broadband.

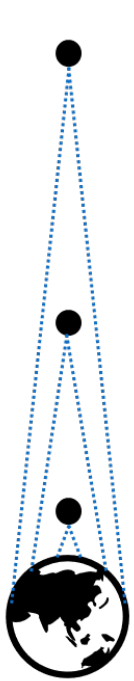
No alternative: in locations that are very remote, are inaccessible or for moving assets.

Rapid deployment is possible, provided that sat's are operational, ground stations in reach and stable power supply available on location.

Resilience of satellites as space-based assets.

Technological advances: global capacity is increasing, latency rivals fixed broadband. Connectivity will be achievable with feature and smart phones.

Costs for sat' production, terminals and launches are reducing.



GEO
Geosynchronous/
Geostationary

MEO
Medium Earth Orbit

LEO
Low Earth Orbit

More details on LEO Satellite Constellations: ADB 2021: Digital Connectivity and Low Earth Orbit Satellite Constellations: Opportunities for Asia and the Pacific

Connectivity & Power / Electricity

No connectivity without power supply…
… on the provider side AND on the consumer side.

Off-grid locations: solar, wind, diesel, or hybrid solutions >> increase in costs and space

Rule of Thumb: 3-4 m^2 of panels for every 100 watts of power load (to provide adequate collection during winter or rainy months), plus battery storage…

Antennas
- Macro Cell towers: 2500 watts (or more) per site, requiring power mains or significant alternative energy installations.
- Small Cell tower: 100-200 watts per sector. Best installed in locations with access to mains power.
- Community LTE up to 200 watts for outdoor small cell transmitters, depending on coverage.
- Fixed Wireless: between 5-10 watts.

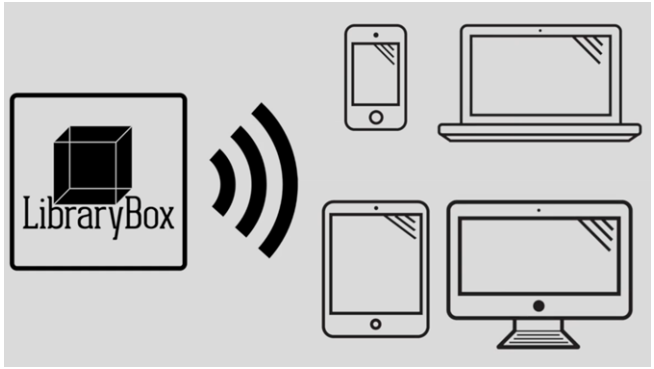
Terminals
- Open Spectrum or LTE fixed wireless terminal requires 3-8 watts of power
- Microwave link 30-50 watts,
- LEO satellite terminals available today consume between 50-150 watts.

Source: ADB 2022 (forthcoming): Last Mile Connectivity - Addressing The Affordability Frontier

Shared rural LTE tower has three sectors and one microwave backhaul link. Supporting it requires a large solar array plus a diesel generator. Energy requirements take up more than 100 m2 of land. Source: Photo from Chris Parker. RCG at TECT Park Cell Tower, 2021.

Solutions for Low-tech Environments

Getting connected without WIFI



LibraryBox is a combination of a router, USB drive, and software. It provides a low cost WiFi device hosting a library of digital documents, browser based applications and other materials suitable for use in a classroom.

EdTech use with solar power

SolarSpell allows accessing digital learning resources using solar power.

Open-source learning solutions for offline use

Kolibri is an offline-first learning platform that runs on a variety of low-cost devices. Its Product Ecosystem includes a curricular tool and a library of open educational resources.

Emerging tech and EdTech

The sandbox approach

- AI enabled adaptive learning
- nano learning
- Augmented/Virtual reality for education
- Metaverse
- Gamification
- Innovative homeschooling
- blockchain for safe keeping of educational achievements

Tech-enabled immersive learning : XR(extended reality, includes AR,VR) is being increasingly used to improve learning processes.

For example : AR can be used to improve visual learning process, (using AR, students can see 3D depictions of dinosaurs, chemical elements, the human body and more. Danish startup Labster provides interactive VR laboratories that STEM students can run experiments with. While Google Expeditions lets classes take virtual field trips to places like Mount Everest and the Louvre.**VR is also assisting special needs students.** Students with disabilities can use VR to see things they can't physically access. And autistic kids can rehearse scenarios they're likely to encounter in the outside world.

Innovative K-12 Homeschooling Startups :

One of these startups is Prisma. It Offers a blend of in-person and live online learning experiences, thus separating the roles of instructor and facilitator/coach.Another startup Outschool works by matching students with teachers for online learning in small groups, conducted live.

Mobile learning is picking up pace, expected to reach over $280 billion by 2027.

Gamification :

- Gamification has become an important tool for education in the k-12 space. Minecraft is the most common example. It provides an immersive digital environment for learning and is used by educators in more than 115 countries. This "sandbox" style game has been used to create stage performances, write stories, and even teach students about DNA.

- With over 100 million monthly players, gaming platform Roblox is now even bigger than Minecraft. It's being used around the world to teach programming and game design.

Nano Learning :

Nano-learning describes a new EdTech concept where we can get ultra-bite-sized lessons exactly when and where we need them. brief lessons – such as those provided by the text message learning service Arist, can be absorbed over WhatsApp, Slack, or Teams. Other nano-learning platforms impart knowledge over social networks like Twitter or TikTok.

The Sandbox Approach

A SAFE, NEUTRAL FACILITY FOR ADB TO PILOT INITIATIVES ON EMERGING TECHNOLOGIES

LAYING THE FOUNDATION FOR CONTINUOUS INNOVATION

WE INFUSE NEW TECHNOLOGIES TO IMPROVE OPERATIONS, ACCELERATE GROWTH, AND TRANSFORM CULTURE

DEMONSTRATED BENEFITS

- Repeatable framework and governance structure for digital innovation
- A culture of digital innovation
- Administration efficiency opportunities
- Increased quality and productivity
- Improved compliance for due diligence
- Increased business opportunities

How to use EdTech?

2. Government/Policy

2.1 Policy/funding

2.2 Curriculum/content delivery

2.3 Training

Overview on National EdTech Implementation Strategies & Projects

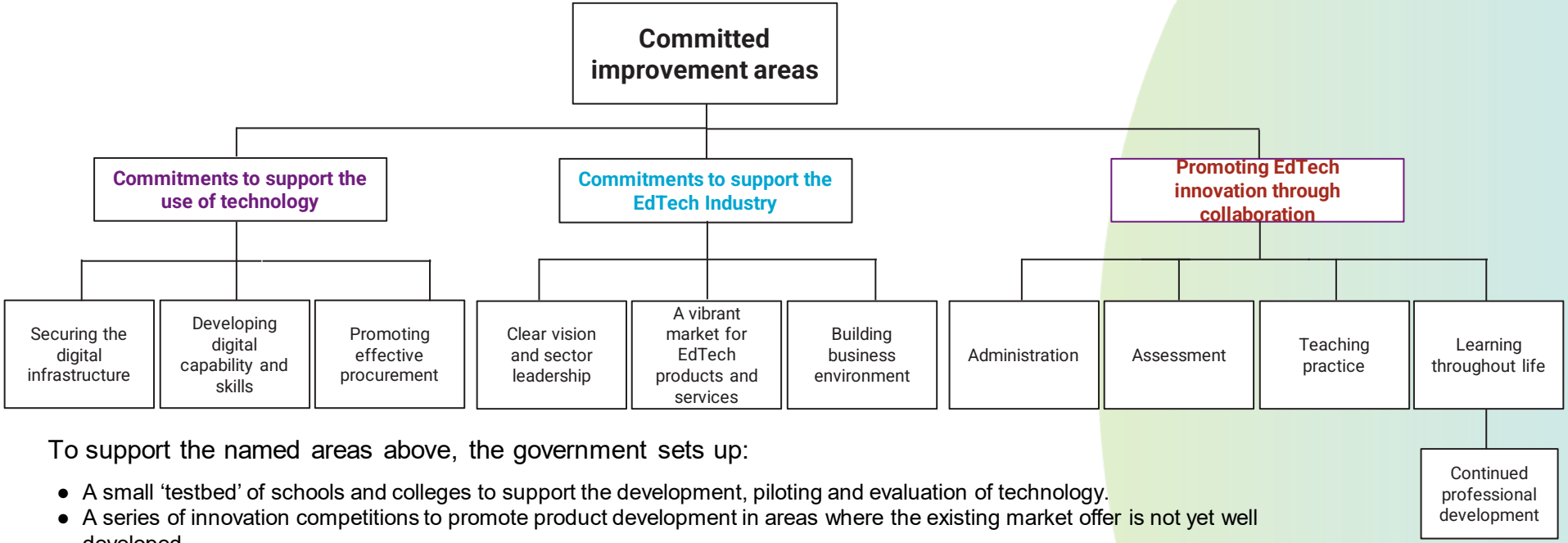
And What Can We Learn From Those?

The UK National EdTech Strategy (2019)

The strategy sees five key areas where technology can drive a step change:

1. **Administration processes** – reducing the burden of ‘non-teaching’ tasks.
2. **Assessment processes** – making assessment more effective and efficient.
3. **Teaching practices** – supporting access, inclusion, and improved educational outcomes for all.
4. **Continuing professional development** – supporting teachers, lecturers and education leaders so they can develop more flexibly.
5. **Learning throughout life** – supporting decisions about work or further study and helping those who are not in the formal education system gain new skills.

The UK National EdTech Strategy (2019)



To support the named areas above, the government sets up:

- A small 'testbed' of schools and colleges to support the development, piloting and evaluation of technology.
- A series of innovation competitions to promote product development in areas where the existing market offer is not yet well developed.
- Leading 'demonstrator' schools and colleges to exemplify how these technologies can be used to best effect, and which build on existing good practice in the sector.
- A new EdTech Leadership Group, made up of representatives across the education sector and industry to continue to drive this agenda forward, find new ways to collaborate and to produce an EdTech agreement by the end of the year.

The UK National EdTech Strategy (2019)

Conclusions - What Works?

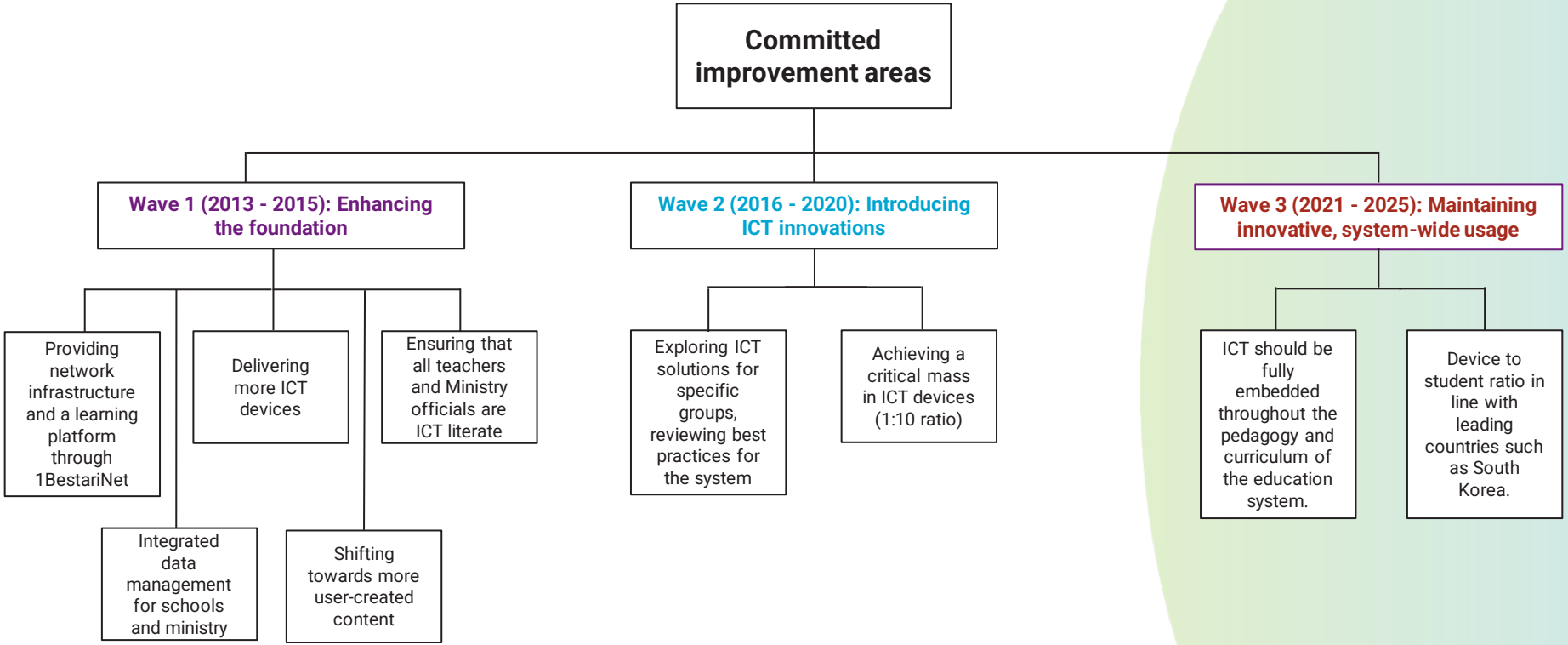
- **Leading 'demonstrator' schools** system is a solidly built system that communicates its operations transparently. The whole system is set up smartly, having impact measurement in place, extra funding provided for schools who provide the trainings and already over 100 000 classroom staff have joined trainings. It has continuum and it scales up professional learning in a practical, fairly low cost way when it's publicly funded and based on collegial support.
- **The EdTech Testbed** was operational, but it ended after the project funding was spent. The main benefactors seem to have been the companies joining the program, since they got tens of thousands of funding without accountability. The findings regarding the use of EdTech were very obvious. During a few months pilot it's hard to make valid and valuable new findings, but the companies must have got good insights from the users to support product development.
- **EdTech leadership group** lacks of transparency when there's no operational side of it, no website, and no information available what it does. However, people who belong to the group, are working as EdTech ambassadors, hosting presentations in teacher seminars and EdTech events.
- **EdTech Innovation Competitions** have not been organized apparently due to Covid19.

Malaysia Education Blueprint - ICT Strategy

Measures undertaken will include:

1. Providing students with the skills and knowledge to learn effectively and live productively in an increasingly global and digital world
2. Equipping all 10,000 national schools with 4G Internet access and a virtual learning platform that can be used by teachers, students, and parents through the 1BestariNet programme
3. Training all teachers to embed ICT in teaching and learning in order to support student learning
4. Increasing the number of ICT devices
5. Piloting ICT innovations for delivery such as distance-learning and self-paced learning before scaling up nationwide

Malaysia Education Blueprint - ICT Strategy



Malaysia Education Blueprint - ICT Strategy

Conclusions - What Works?

- **Bestarinet & VLE Frog learning platform to 10 000 Malaysian schools:** The system is up & running, and there are indications of its positive impact on students' learning. However, the system has also been criticized for poor connectivity in rural areas.
- **TPD:** Not all teachers were comfortable with the use of ICT. Although teachers were competent in ICT, they did not necessarily use ICT in the classroom due to negative attitude towards technology.

Identified Best Practices Through Country Analysis

	Low-tech/income	Medium-tech/income	High-tech/income
Infra	*Wifi-in-a-box & offline EdTech*	*Interoperable cloud systems*	*Advanced learner analytics*
Governance	*Centralized (MESO-level) decision making*	*Autonomy to identify and circulate good tech practices*	*Autonomic, Self-improving tech user schools*
Teachers	*In-service TDC training*	*Communities of digital practice*	*Continuous digital pedagogy training with expert teachers*
Learners	*Digital fluency skills*	*Teacher-led, tech enabled personalization*	*AI led personalization & interdisciplinary learning*
Providers	Use of private EdTech solutions	School-industry partnerships for continuous knowledge exchange	New EdTech innovations through school-provider co-development

How to use EdTech?

3. Schools/Teachers

3.1 Teacher capacity in EdTech

3.2 Equipment/software

3.3 Governance

3.4 Community support

Teacher capacity in EdTech

Teacher's digital competencies

- Digital competence affects heavily on teacher's motivation and attitude to use EdTech.
- Wide skills gaps exist within countries, districts and schools.
- Self-evaluation tools promote self-reflection and continuous development.

Teacher's pedagogical competencies to use EdTech

- Affecting heavily on whether learning outcomes are being achieved.
- EdTech providers offer product specific training, but there's a lack of scalable holistic pedagogical training on how to use EdTech.

Opportunities: Double Teacher Modality

Main/expert tutor deliver lecture online covering one or many remote classrooms.

Assistant tutor present in class answering basic questions, marking the assignment and homework, and collecting feedback.

How to use EdTech?

4. Students/Parents

4.1 Digital capability of students

4.2 Connectivity and devices at home

4.3 Online access to curriculum content

4.4 Communication

Opportunities: Flipped Learning

Research on flipped classrooms in developing countries (2017) suggest the following four elements aiding the success of flipped requirements.

1. Flexible Environment

Students work in groups and are able to choose where and when to learn.

2. A change in the learning culture

Educators facilitate student-centered learning and learning through exploration.

3. Intentional content

Educators create content for instructional delivery. Learned topic needs to be suitable for flipped learning modality.

4. Professional educators

Teachers must capitalise on the learning opportunities existing and must observe the students keenly to guide them.

Source: Kashada, A., Li, H., & Su, C. (2017). Adoption of Flipped Classrooms in K-12 Education in Developing Countries.

How to use EdTech?

5. EdTech Providers

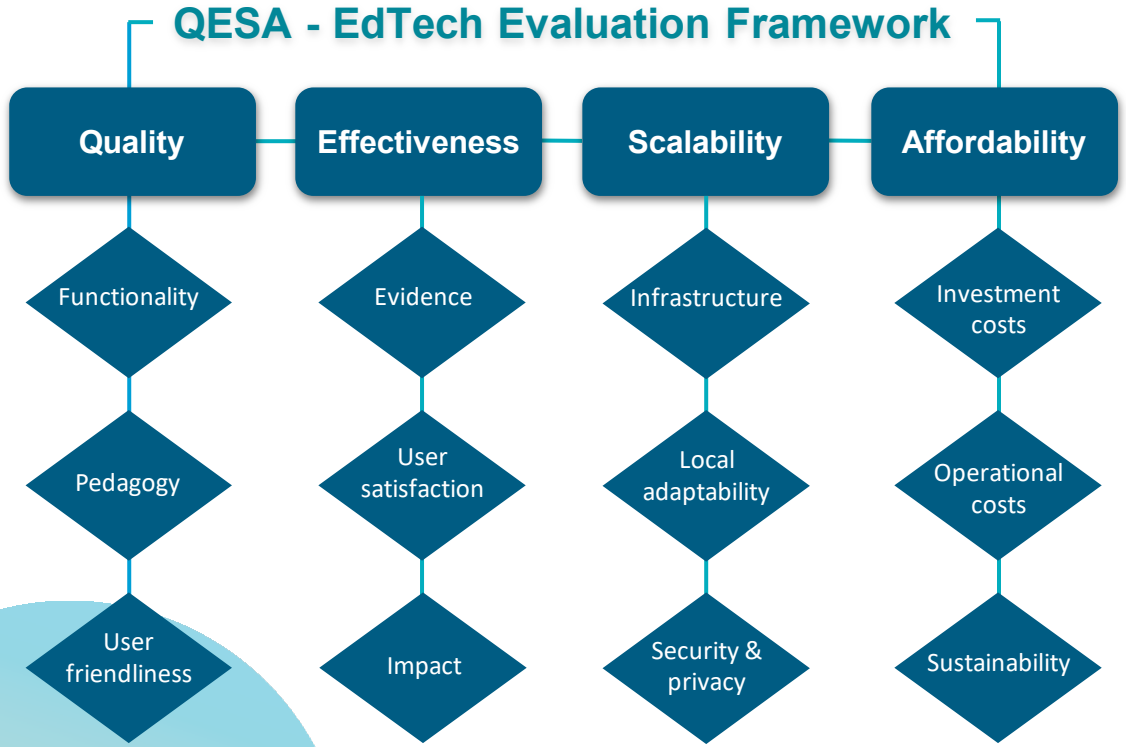
5.1. e-learning

5.2 Online content

5.3 Integrators, emerging tech

5.4 Partners/Sponsors

How to Evaluate EdTech Products?



The QESA EdTech evaluation framework guides to select solutions that can improve education and learning at scale.

Evaluation and selection of solutions requires finding an **optimal balance** between the four elements of *quality, effectiveness, scalability* and *affordability*.

QESA Evaluation Rubric

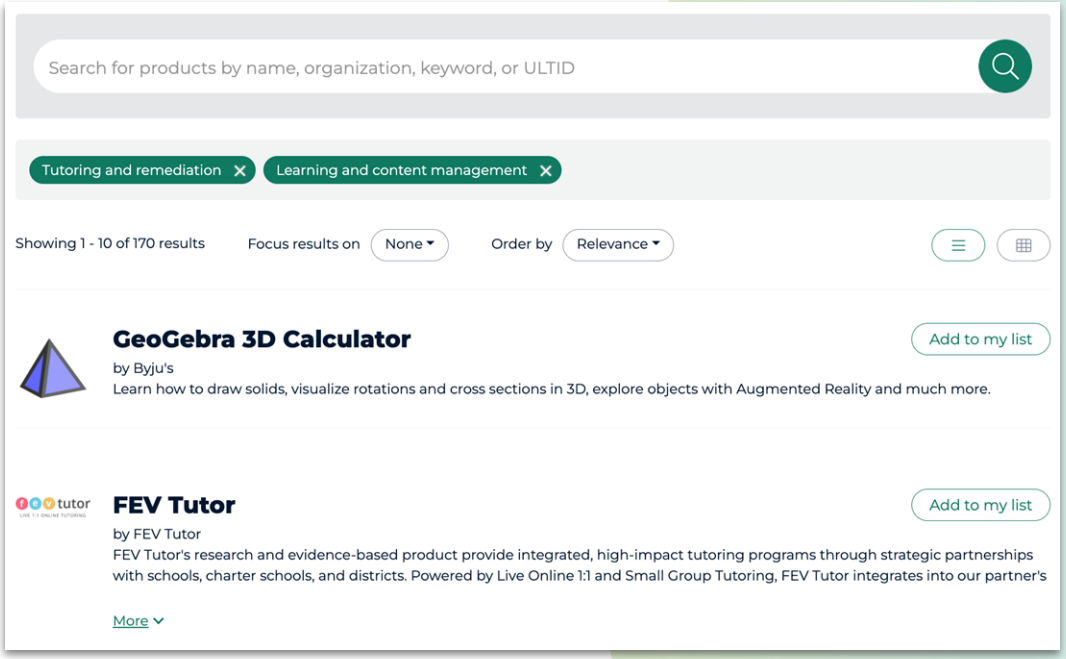
Quality			Effectiveness			Scalability			Affordability		
Functionality	**Pedagogy**	**User friendliness**	**Evidence**	**User satisfaction**	**Societal Impact**	**Infrastructure**	**Local adaptability**	**Security & privacy**	**Investment costs**	**Operational costs**	**Sustainability**
Quality content	Interactivity	Usability	Literature reviews	Number of users	Improved education system	Device & technical requirements	Training & technical support	Data collection	Usage fees	Device & infrastructure costs	Adaptability & sustainability of business model
Effective communication	Adaptivity	User Interface/ Visual Design	Case studies	Customer satisfaction	Improved equity	Technical scalability	Localization / tailoring	Data privacy	Payment models	Training costs	Flexibility of payment models
Effective Assessment	Sociability	Cross-Cultural Adaptation	Empirical research	Reviews		Integrations (API)	Migration of user data			Maintenance/ support costs	
Data utilization	Visuality									Data migration costs	
	Creativity										

How to Find EdTech Products?

EdSurge

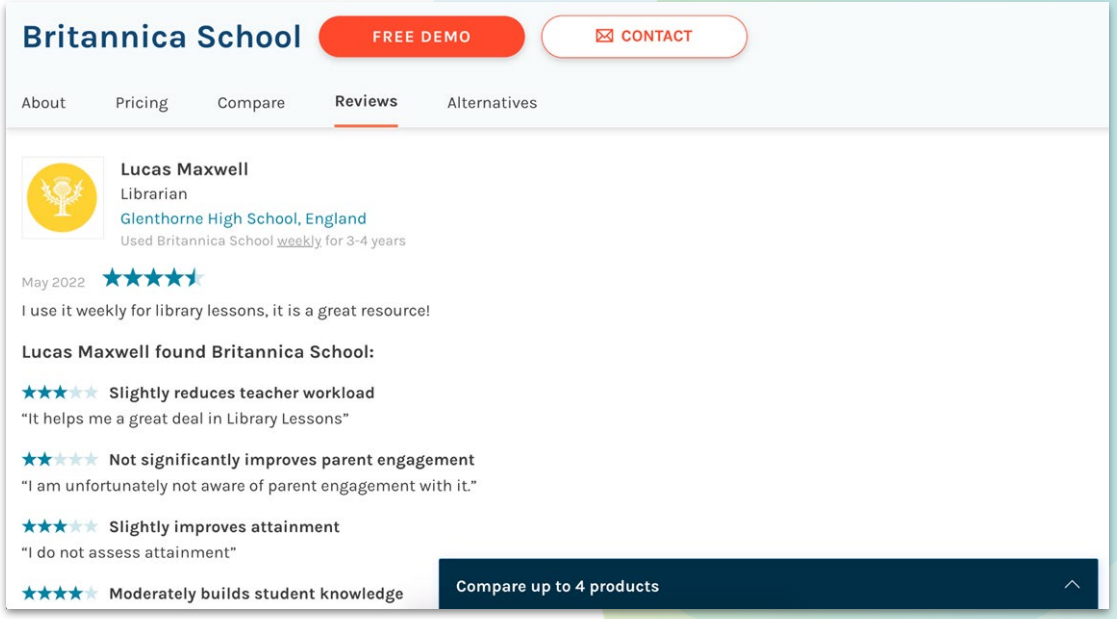
EdSurge Product Index gathers hundreds of EdTech products, including product description and quality review.

Product Index includes more products for the U.S. market.



How to Find EdTech Products?

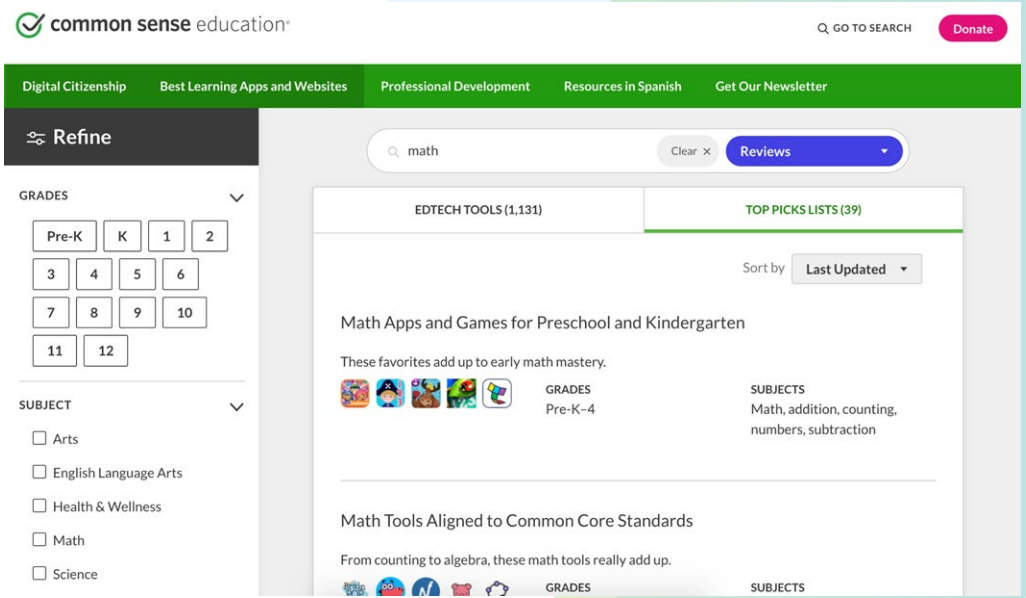
EdTech Impact's product catalog is built upon user reviews. It helps to understand how EdTech products truly work by gathering over 10 000 vetted product reviews from teachers. Users can also compare products against similar type of solutions.



How to Find EdTech Products?

common sense media

Common Sense Media includes over 1000 EdTech products which can be searched based on grade level, subject, and purpose. “Top picks” lists help to select best-rated applications for certain subjects.



ADB Roadmap for Successful EdTech Implementation

Why utilize EdTech? → What is EdTech? → Where do you stand? → How to utilize EdTech?

”一年之计，莫如树谷；十年之计，莫如树木；终身之计，莫如树人。”

It takes one year to grow grains;
It takes ten years to plant trees;
It takes lifetime to educate people.

A journey of a thousand miles begins with a single step

by Guan Zhong (723 BC – 645 BC)