Concept note for the
2023 Global Education Monitoring Report
on technology and education

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**Global Education
Monitoring Report**

The *Global Education Monitoring Report* (GEM Report) is an editorially independent, authoritative and evidence-based annual report published by UNESCO. Drawing its mandate from the Incheon Declaration at the World Education Forum and the Education 2030 Framework for Action, it is the international community's tool for monitoring and reporting on:

- Progress towards the education targets in the Sustainable Development Goals (SDGs) adopted by the United Nations Member States in September 2015
- The implementation of national and international strategies aimed at contributing to the achievement of SDG 4, the global education goal.

Accordingly, the GEM Report contains a monitoring part, which primarily reports on progress made on each of the 10 SDG 4 targets, and a thematic part, which focuses on a key topic for the achievement of SDG 4, decided upon by the GEM Report's international Advisory Board. This concept note introduces the proposed scope and approach of the 2023 GEM Report on the theme of technology and education. It is a working document, intended to provide a basis for consultation, stimulate discussion and elicit feedback from the report's multiple stakeholders.[1]

Technology refers to the application of scientific knowledge in any sphere of life. Education is commonly associated with applications of information and communications technology, known as education technology, which will be the main focus of this report. But other technologies – construction, energy and transportation – also have relevant applications in education.

Three attributes of education technology indicate its complexity. First, it takes many forms. It is an array of overlapping, integrated and independent tools. It is a computer, a book, a writing instrument, an encyclopaedia, a map, a file cabinet, a display device, a TV, a microphone, a camera, a phone, a radio and a tutor. It may be one-to-many, one-to-one or peer-to-peer technology. It may be professionally produced or have user-generated content. It may be specific to schools and place-based or it may transcend time and place. Each modality constitutes education technology but also has different manifestations, challenges and qualities that define its possible uses. Each demands distinct infrastructure, design, content and pedagogy, and each may promote different types of learning.

Second, education technology operates in many ways. It delivers content, creates learner communities and connects teachers with students. It provides access to information. It gathers, analyses and reports data and builds visual, cartographic and statistical models. It may be used for formal or informal learning and it can assess what has been learned. It may require students to learn alone or with others, online or offline, stand-alone or networked. It is used as a tool for productivity, creativity, communication, collaboration, design and data management. Like any complex system, it is composed of infrastructure and materials and involves people in different roles. And it is dynamic, constantly evolving at a rapid pace.

Third, for all their diversity, education technologies are increasingly integrated. The convergence of technologies, such as applications and devices, the rapid development of new technologies, the movement of applications onto the cloud and the protean nature of the internet often mean that attempts to differentiate, categorize and measure them are in vain.

This note reviews how technology in education is described in the Incheon Declaration and the Education 2030 Framework for Action, the foundational documents of SDG 4, and how its relevance has increased in the context of the COVID-19 pandemic. It then discusses the often bitterly divided views of the role of technology. The note then outlines (i) key challenges in education to which appropriate use of high technology and low technology can offer solutions, while recognizing that other applications of technology may also be detrimental and (ii) system-wide conditions that need to be met for technology in education to reach its full potential. Selected examples of other technologies and the role they can play in education are also discussed. Finally, the next steps in the preparation of the report are listed.[2]

THERE ARE GREAT EXPECTATIONS FOR TECHNOLOGY IN SDG 4

The achievement of SDG 4 is dependent on opportunities and challenges posed by technology. The Incheon Declaration was explicit: 'Information and communication technologies (ICTs) must be harnessed to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more effective service provision' (§10). The Education 2030 Framework for Action called on education systems

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1   The concept note draws on a commissioned think piece by Mary Burns available on the GEM Report website.

2   Regional editions of the 2023 GEM Report may focus on South-eastern Asia and the Pacific.

to be 'relevant and respond to … technological advances', helping children, youth and adults to develop the 'flexible skills and competencies they need to live and work in a … technology-driven world' (§6). The existence of 'relevant teaching and learning methods and content … taught by well-qualified, trained… teachers … supported by appropriate information and communication technology' (§14) was elevated to a criterion of education quality.

Selected SDG 4 targets refer to technology. A 'tertiary education system supported by technology, open educational resources and distance education can increase access, equity, quality and relevance' (§14), therefore, target 4.3 calls on policies and programmes for the 'provision of quality distance learning … with … use of technology, including the Internet, massive open online courses and other modalities … to improve access' (§45). Target 4.4 on skills for employment, decent jobs and entrepreneurship is monitored through two technology-related indicators: the proportion of youth and adults with ICT skills (indicator 4.4.1; self-reported) and with at least a minimum level of proficiency in digital literacy skills (indicator 4.4.2; directly assessed).

Technology is presented as a potential contributor to equity under target 4.5, where 'distance learning, ICT training, access to appropriate technology and necessary infrastructure' can 'facilitate a learning environment at home and in conflict zones and remote areas, particularly for … marginalized groups' (§57). Mobile technology 'holds great promise for accelerating progress' towards target 4.6 on adult literacy (§59). Under target 4.a on learning environments, countries are invited to ensure that 'every institution … has … appropriate learning materials and technology' (§66). The relevant indicator on the proportion of schools offering basic services (4.a.1), includes access to the internet and computers for pedagogical purposes, and adapted materials for students with disabilities.

Finally, under target 4.c, the Framework for Action reminds countries to provide teachers 'with adequate technological skills to manage ICT and social networks, as well as with media literacy and source criticism skills, and provide training on how to address challenges of pupils with special education needs' (§74).

In brief, these documents capture five distinct channels through which technology affects education:

- Input: Ensuring the provision, operation and maintenance of technology infrastructure in education, such as computers or internet connectivity, at school or at home, requires considerable capital investment, recurrent expenditure and procurement skills.

- Means of delivery: Teaching and learning stand to benefit from education technology. But the fast pace of technological change and control of evidence by technology providers makes it is difficult to know which technologies work best and under what conditions.

- Skill: Education systems are being called upon to support learners at various levels to acquire digital and other technology skills, raising questions on content, the best sequence of relevant courses, appropriate education levels and provider modalities.

- Tool for planning: Governments are encouraged to use technology tools to improve the efficiency and effectiveness of their education system management, for instance, collecting information on student behaviour and outcomes.

- Social and cultural context: Technology is affecting all spheres of life, expanding opportunities for connection and access to information but also posing risks to safety, privacy, equality and social cohesion.

COVID-19 HAS BEEN A TOUCHSTONE FOR THE ROLE OF TECHNOLOGY IN EDUCATION

The onset of the COVID-19 pandemic has accelerated the need to apply technology in education. School closures have forced governments to use distance education to not interrupt learning. Radio and television programmes are being used in poorer countries, some of which have never stopped using these tools for reaching remote populations. Even low-technology approaches, however, have little chance of ensuring learning continuity for all. Among the poorest households in the poorest countries, few even own a radio, let alone a television. Mobile phones are more commonly owned, but the cost of information exchange required for meaningful education content can be prohibitive. Even when schools provide distance learning, other challenges negatively affect disadvantaged students' opportunity to learn: relying on the support of parents and guardians with little or no education; living in a home environment without a quiet place to study; being assigned household chores and other work; and lacking the means to have special educational needs fulfilled.

Online learning platforms, enabling synchronous or asynchronous learning, are being mobilized in almost all countries but best practices are mainly followed in the richest ones, where there is not only high ownership of devices and fast internet connectivity but where investment in platforms had gradually grown to be able

to accommodate a rapid increase in users. But even in these countries, the digital divide means that many students and teachers do not have adequate internet connections and the right equipment, necessary skills and appropriate study environments to take advantage of these platforms' potential. It was always going to take time to transition to technology being part of the daily education experience for all. Most teachers and school administrators had to switch overnight to new tools to deliver lessons, distribute content, correct homework and communicate with students and parents. Working from home is compromised for those who had to look after children. The introduction of hybrid and blended learning further challenges students and teachers.

THE ROLE OF TECHNOLOGY IN EDUCATION DIVIDES

Education technology generates passionate debate. At the risk of misrepresentation, we can describe two fictional sides. 'Technophiles' note the great changes that technology has brought to the world, including to employment. Driven by excitement and idealism, they marvel at how technology pushes frontiers in all domains of life. They advocate for education to embrace the latest advances, from hardware and gadgets to software and apps. They lead the way in experimenting with these opportunities, seeing technology as the inevitable way forward to which education should adapt. They argue that almost every disruptive technology in the history of humanity has been actively fought by established orders.

'Technosceptics' argue that education and learning are not about automation. They oppose the domination of the education agenda by technology providers and feel more comfortable with existing pedagogical tools, tested by time. They advocate banning smartphones in schools and are concerned by potential addiction, gamification, commodification, alienation, bullying, surveillance, security and control. They might not deny that technology is changing daily lives but favour preserving education as a safe haven. They are sceptical that technology provides opportunities to radically reimagine education. They point instead to education and learning being a timeless human endeavour.

A synthesis of these two different worldviews is the challenge facing education systems today. The debate is cacophonous and contradictory. The same terms are being used by the proponents of each view. Is technology leading the way for democracy in education by potentially offering unfiltered access to all human intellectual output for all at the hit of a button; or is it posing a grave threat to democracy through the unprecedented ability for a few to control the content that reaches the many? Does technology offer countless opportunities or is it being monopolized, reducing opportunities, on a technology-dependent trajectory from which there will be no return? Does education technology help countries leapfrog stages of development and promote equality; or does it exacerbate inequality – between and within countries? While there are those who favour embedding technology-related competencies in young children's care and education, others urge caution, calling for more research into the effects of technology's exposure on young children's cognitive, social and emotional development.

Technology is evolving at a breakneck speed. Those who lead technological developments are always a step ahead of those who can provide reflection and evaluation, on their applications and negatives consequences and those who need to take relevant decisions on legislation, policy and regulation. Uncertainty over the direction technology is taking fuels anxiety that most people will be left behind.

Research on technology in education is as complex as the technology itself. Time and again, research shows that the promise of education technology is not being realized to its full potential, dashing hopes of major impacts. And yet research is needed: Who stands to benefit from the early adoption of particular technology? Is it at the expense of the common good? Are results influenced by commercial interests, indeed by those who created the technology?

This is not an easy task. Studies evaluate experiences of learners of various ages using different methodologies applied in contexts as different as self-study, classrooms and schools of different sizes and features, non-school settings and at system level. Findings that apply in some contexts are not always replicable elsewhere. While some conclusions are being drawn from long-term studies as some technologies mature and the dust around them settles, the seemingly endless stream of new technology products makes definitive conclusions impossible, calling for research to continue. Another challenge is that technology has multiple education benefits that are not easily measured empirically, given technology's ubiquity, complexity, utility and heterogeneity. But absence of evidence of benefits does not mean that there are no benefits.

WHAT EDUCATION PROBLEMS CAN TECHNOLOGY ADDRESS?

Instead of taking technology as the starting point, as is often done, the primary focus should be on the kind of education we want and the major challenges that we are facing to fulfil this vision. Only then should we ask the question of whether and how technology can help overcome these challenges. This requires setting criteria to judge the contribution technology can make to education in order to separate hype from substance.

ACCESS, EQUITY AND INCLUSION

Technology's capabilities offer education systems tools to overcome longstanding inequalities along two key dimensions: reaching disadvantaged populations and ensuring content reaches all learners in more engaging and cheaper formats.

Access for disadvantaged groups

How can we provide education to all hard-to-reach learners?

Education systems, which have struggled to reach several groups of disadvantaged learners, have found in technology a powerful tool to overcome constraints:

- Delivering education to remote populations has relied upon the application of technology, from radio and interactive audio instruction to today's online learning platforms, massive open online courses and virtual schools.

- Massive open online courses, zero cost university degrees and microcredentials have also offered education access for populations who may be constrained in several other ways, including by time.

- Education in emergencies can greatly benefit from technology, which has been applied to overcome distance, lack of resources and exclusion from formal learning opportunities.

- Technology has opened doors to learners with disabilities and special educational needs. Assistive technologies have offered inclusive means of representing information, expressing knowledge and engaging learners. They have been used to personalize learning to accommodate students' differing and sometimes conflicting needs.

The COVID-19 pandemic has tested the capacity of distance education to ensure learning continuity at system level, even at global scale. It has shown that access to technology, a condition discussed later in this note, remains a challenge, especially among the disadvantaged populations for whom technology is meant to provide a solution.

But there are other gaps, even among those who in principle have access to technology. Women are less likely to use ICT for basic purposes, let alone for computational or coding purposes. Stereotypes of women as possessing fewer digital skills and less self-efficacy can prevent more girls than boys from developing related competencies. Women and girls are also less exposed to opportunities to acquire digital skills at work and in education.

Access to content

How can more knowledge reach more learners in more attractive and cheaper formats?

Technology provides major logistical support for teaching and learning. It functions as a tool of access, dissemination, enhancement, replacement and automation. It can be used to locate and assign resources to accomplish an assignment and ensure access to multimodal content. With unlimited storage capacity, web pages and digital readers have replaced books and can make reading more accessible. But teachers and students need access to content and resources. Development of content is costly, particularly for self-paced and asynchronous online courses, where high-quality content is needed. Across the globe, ministries of education and schools develop content in various ways, from purchasing materials from international media companies to developing their own content with local universities, media and designers.

The open education movement has emerged in response to the cost of content and commercialization of previously free content and platforms, which can threaten access to quality learning opportunities for all. Defined by the principle that access to knowledge should be free, open and of high quality for all learners, the movement is aligned with concepts such as open access, open data, open assessments, open pedagogy, open software and crowdsourcing. Its most important element is open education resources, in digital or analogue media, that are in the public domain or have been released under an open licence that permits no-cost access, use, resharing, adaptation and redistribution by anyone with no or limited restrictions.

Such resources can be remixed and redistributed, so developers can repurpose, translate and localize materials, addressing the needs of under-represented communities, empowering them to create their own content, appropriate to their experience and cultures, including in languages the students and their teachers speak even in the most marginalized communities. Such resources emerged in tertiary education in high-income

countries but have also appeared in basic education in low- and middle-income countries, while they can support lifelong learning. Yet despite their advantages, they still face obstacles to large-scale adoption.

QUALITY

Education helps individuals fulfil their potential by developing core values and acquiring fundamental knowledge to participate effectively in work and life and build better societies. Education systems can use technology to improve acquisition of basic skills – but the definition of basic skills keeps expanding as the world is transformed by technology.

Basic skills

How can pedagogy be transformed to engage students and improve learning?

The development of proficiency in basic skills passes through stages, from initial acquisition to increasing fluency and application in specific areas. Disadvantaged learners often fall behind their peers in developing such proficiencies. They may not have enough stimulation and support at home or may have missed out on pre-primary education so arrive in school already with knowledge gaps, such as limited vocabulary or familiarity with numbers. They may find it difficult to do their homework with living conditions not conducive to study so may need more practice in school. Yet, their classes may be large and teachers cannot dedicate to them the amount of time they need.

Technology could help teachers offer more opportunities for practice, increasing efficiency in the use of classroom time, through hardware, such as interactive whiteboards, or software: closed or behaviourist applications – e.g. games, puzzles and tutorials – through which students learn 'from' the computer which generally functions as a tutor, and open or constructivist applications – e.g. email, concept mapping, spreadsheets, design programmes, simulators and word processing – through which students learn 'with' the computer. Software can offer exercises that adapt to ability levels, increasingly with the support of artificial intelligence that personalizes learning, can help learners progress at their own pace and encourage them to catch up with their peers. If designed well, software can help students explore various ways of learning that suit their style, including approaches that engage learners to create their own content and interact with peers. But the right mix of traditional and technology-based instruction will vary by skill, available resources and teacher characteristics.

Technology is a source of both potential support and new challenges in classrooms. Technology applications can help teachers maintain student motivation and concentration and bring them to order; receive scripted support; communicate with parents; and carry out multiple routine tasks, such as how to present information, summarize discussions, take notes and annotate texts. But for most people, technology is associated with challenges in classrooms. Disruption is one. A common policy debate is whether mobile phones should be used or banned, in other words, whether their pedagogical use should be promoted or their capacity to distract should be minimized.

Digital skills

How can education systems provide the new skills that technology demands?

As technology increasingly permeates daily lives, learners need skills to navigate the digital world and, through them, to explore new ways for developing competency to participate in work, society and politics. Individuals need to critically 'access, manage, understand, integrate, communicate, evaluate and create information' for multiple purposes. These competencies include the following:

- The promise of digital spaces as diverse and open has been blunted by misinformation, disinformation, polarization and bad behaviour, stoked by anonymity. This has impacted education calling for data on data and information literacy. Views that stoke hatred, discrimination and disrespect and incite violence are disseminated through technology. They affect debates over the content of education and infringe on academic freedom. They pose a risk to the social cohesion that education has been tasked with helping to build.
- Technology holds great potential for networked and distributed learning. Online environments expose learners to new ideas, sources of information and ways of communication and collaboration – but also call for skills to fulfil this potential, which range from soft skills to navigating online services.
- Technology has created a need for skills to create digital content, ranging from opportunities for expression to contributions to the teaching and learning process and to advanced skills in coding and programming.
- Digital connectivity and the use of social media and instant messaging platforms can expose learners to a range of safety concerns, from online abuse often from their peers, to digital identity

theft. Technology can have a negative impact on health, happiness and well-being, including from addiction to games, entertainment, information and videos. Soaring screen time reduces outdoor activity and sleep quality; anxiety, obesity and social isolation are on the increase. Attention deficiency is linked to continuous exposure to phones and devices. Competency is using technology to one's positive benefit is needed.

- Finally, digital technology requires familiarity with a range of problem-solving techniques.

How education systems approach new and continuously evolving objectives related to technology is a major challenge. They need to assess and anticipate skills needs, develop competence frameworks, issue guidelines, draft curricula, design courses and allocate funds. Textbooks need to be updated more frequently and to become dynamic and interactive. Knowledge on how best to build these skills and competencies is also evolving. Another question is about the right mix between formal, non-formal and informal learning opportunities. If many learners reach proficiency outside school settings, the focus of school activities needs to be reconsidered.

TECHNOLOGY DEVELOPMENT

How can education systems support technological development?

Technology is itself a subject, taught at all levels of education but especially at the post-secondary level. Educators globally want to see improvements in science, technology, engineering and mathematics. Governments aim to increase the share of students in these fields. Many also try to promote equality, notably between females and males. The application of technology is shaping economies and redefining occupations and professional requirements. It is also shaping education and training, for example, simulators have revolutionized training in some professions. Education can help spread the use of advanced technologies by developing skills for their effective deployment and can respond to needs emerging from job displacement in sectors affected by automation.

Technical, vocational and higher education institutions play a central role in national strategies for technological development, employment and economic growth. However, this role is in flux, as education institutions are acquiring more autonomy to set their own strategies. They need to update their study programmes, procure equipment, anticipate future

needs and validate skills, as technology changes at great speed, transcending disciplines. They need to attract income from technology firms which seek to partner with them. They need to compete for students, especially as skills are being acquired outside formal education. Education also plays a role in transferring technology from countries that have it to countries that need it, such as partnerships between education institutions and scholarship programmes, which are constantly being rethought.

SYSTEM MANAGEMENT

How can assessment and other education management data be more relevant and widely used?

Technology can improve data collection and analysis to support education decisions and practices. In past years, many technological changes have been seen in the assessment of learning achievement, such as automating grading tests, combating plagiarism, storing assessment information to improve classroom practice, and introducing adaptive computer-assisted assessment. New technologies use response speed, answer sequencing and different problem-solving approaches to advance from traditional evaluations of multiple choice questions. Technology also serves in assessing complex skills, such as collaboration.

But is the rich information generated being used sufficiently, effectively and efficiently? Countries may not be linking curriculum and instruction practice. They may be choosing sophisticated assessment solutions but lack the capacity to draw inference and interpret results. As government agencies often lack such capacity, the role of private providers is increasing, raising concerns over their influence over education policies, curricula and textbooks. Questions over data privacy are being raised, as the use of online platforms during COVID-19 has provided opportunities to generate more data. It is questioned whether the use of more performance data is at the expense of education quality. A related concern is that private companies wield too much control over the certification of digital skills, which are often attached to proprietary technology.

Technology increases opportunities to collect other useful education management information. It can be used to improve processes, from prompt teacher salary payments through mobile money to building maintenance and other resource allocation planning through geographic information systems. Payroll data can be combined with teacher training management. Textbook procurement and distribution can be

improved using geographic information systems for resource allocation. And data collection and verification can be simplified through the use of mobile data.

WHAT CONDITIONS NEED TO BE MET FOR TECHNOLOGY TO SUPPORT EDUCATION?

For technology to support education, certain conditions need to be met. But in practice, they are not. How can education benefit from technology when hundreds of millions of learners lack access to electricity, let alone to internet and devices; where there is no regulatory framework to protect them; and where teachers are not prepared to use technology?

ACCESS TO TECHNOLOGY

How can education systems ensure that all learners have access to technology resources?

All of technology's promises are of no value if they are only accessible to countries' richest people and the world's richest countries. By definition, the diffusion of technology is a gradual process. However, the question of equitable dissemination receives insufficient attention by policymakers. The report will look at how access to technology in education is distributed within and between countries in terms of infrastructure and networks, such as electricity and the internet, as well as the distribution of individual devices such as laptops, tablets and smartphones. Examples will be explored of programmes that compensate for lack of access to electricity or the internet, such as preloading content onto offline technology solutions. The issue of adaptation of such content to the social and cultural contexts of beneficiaries will also be explored.

Public policies that promote the provision of technology will be reviewed in terms of their impact on equity, efficiency and effectiveness in education, and accordingly, the report will ask questions including what decisions governments need to take, how costs of maintenance and replacement are calculated, how finance is ensured, how procurement is organized and how education policymakers access reliable evidence. Policymakers are targeted closely by private providers through aggressive commercial marketing, direct and indirect, of multiple products. How can they be encouraged not to commit to any one kind of technology and instead commit to intended education outcomes and ask who will be best served and through which technologies? International strategies and

programmes that try to improve the availability of technology in education in poorer countries will be reviewed.

GOVERNANCE AND REGULATION

How can education systems protect learners from the risks of technology?

Technology holds great potential for improving education. But as learners increasingly spend their lives online, they face risks related to content, contact and conduct, which spill over to education. Transparent and participatory methods of governance in the use of education technology are increasingly needed to address these challenges and ensure that the right decisions are being made for the benefit of current and future generations.

Legislation and policies are being developed, especially in the Global North to promote standards, regulation and legal protection for privacy, security and safety. The report will review how many countries are making progress in establishing such structures but also how effective these are proving to be. It will also look at the challenges some technologies are posing. For instance, the use of facial recognition technology as a disciplinary device raises questions on consent, the commodification of information and whether such applications are used to control students' minds and education. Applications of artificial intelligence raise ethical issues and pose potential threats to the right to education.

TEACHER PREPARATION

How can education systems support all teachers to teach, use and deal with technology effectively?

Teachers and teaching are a core part of discussions on technology for learning. In a rapidly changing world affected by technology, teachers face large and increasing demands to engage with technology in education and develop related competencies. Such demands have become more intense with the move to distance learning during COVID-19. Successful technology integration, i.e. routine but thoughtful technology use targeted at improving learning, is tightly linked to teacher practices. It involves a relationship between the teacher, technology use and various personal, environmental, cultural and behavioural conditions or factors within particular professional and organizational contexts.

Barriers to teachers' technology use can be organized into three categories. First, there are barriers concerning teachers' access to technology, as discussed above. Second, even if they can access technology, they do not automatically use it. They may be impeded by barriers hard to overcome, related to readiness to integrate technology, beliefs over pedagogy and technology, age and personality. Third, external organizational factors play a role, notably the lack of support by school leaders and the lack of responsive professional development programmes. Training needs to be connected to the objective of transforming teachers into facilitators of learning through technology, establishing where possible online professional learning communities. Training also needs to extend to support personnel.

IT IS NOT ONLY EDUCATION TECHNOLOGY THAT AFFECTS EDUCATION

While the 2023 GEM Report will focus primarily on information and communications technology applications to education, known as education technology, it will also take the opportunity to look at other technologies that can help accelerate the achievement of SDG 4. These other applications will be examined through the lens of selected SDG 4 targets.

Among them, target 4.a on education facilities and learning environments will examine construction and energy technologies that can improve conditions for learners, including solar panels and other renewable energy sources that can increase access to technology, models that can reduce disaster risks for buildings, construction materials that make schools more appropriate for learning and reduce their energy footprint, and water and sanitation technologies that improve learners' daily lives.

NEXT STEPS FOR THE 2023 GEM REPORT

Within the framework described above of how technology relates to key education challenges and minimum conditions, the 2023 GEM Report will ask the following questions:

- What do we know about the role of technology in addressing each of the education challenges identified with respect to access, equity and inclusion; quality; technology development; and system management?

- What do we know about the potential negative impacts of technology on education challenges in each of these areas?
- How do countries facilitate access to technology to ensure there are no gaps between different learners and schools?
- How do education systems embed the use of technology through reforming curricula, redesigning learning materials and supporting teachers?
- How can the negative consequences of the use of technology be addressed in education and in the way they impact education?

Responses to these questions will provide a comparative evidence base from which to draw recommendations. New descriptive analysis captured in country profiles on a range of laws and policies related to technology in education will feature in the PEER website and will complement the report. Discussions on successful technology policies and programmes that have helped strengthen education systems, and critical analyses of the system-wide effects of technology in education will encourage fruitful debates.

This concept note presents the early thinking of the GEM Report team in preparation for the 2023 Report on technology and education. The team would like to invite its readers to:

- Provide substantive feedback to the proposed lines of research.
- Recommend evidence-based examples from around the world that illustrate beneficial and harmful impacts of technology, and solutions to challenges found in different education systems.
- Recommend potential areas of new research drawing on already established or previously unexplored sources of quantitative and qualitative data.

In the coming days, there will be a call for expressions of interest on background papers for selected areas of the 2023 Report.

View the online consultation: Bit.ly/2023consultation

Developed by an independent team and published by UNESCO, the *Global Education Monitoring Report* is an authoritative reference that aims to inform, influence and sustain genuine commitment towards the global education targets in the Sustainable Development Goals (SDGs) framework.