Policy guidelines
for mobile learning

UNESCO
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PURPOSE AND SCOPE OF THE GUIDELINES

UNESCO believes that mobile technologies can expand and enrich educational opportunities for learners in diverse settings.

Today, a growing body of evidence suggests that ubiquitous mobile devices – especially mobile phones and, more recently, tablet computers – are being used by learners and educators around the world to access information, streamline administration and facilitate learning in new and innovative ways.

This set of guidelines seeks to help policy-makers better understand what mobile learning is and how its unique benefits can be leveraged to advance progress towards Education for All.

Developed in consultation with experts in over twenty countries, the guidelines below have broad application and can accommodate a wide range of institutions, including K–12 schools, universities, community centres, and technical and vocational schools.

Policy-makers are encouraged to adopt UNESCO's policy recommendations, tailoring them as necessary to reflect the unique needs and on-the-ground realities of local contexts.

WHAT IS MOBILE LEARNING?

Mobile learning involves the use of mobile technology, either alone or in combination with other information and communication technology (ICT), to enable learning anytime and anywhere. Learning can unfold in a variety of ways: people can use mobile devices to access educational resources, connect with others, or create content, both inside and outside classrooms. Mobile learning also encompasses efforts to support broad educational goals such as the effective administration of school systems and improved communication between schools and families.

Mobile technologies are constantly evolving: the diversity of devices on the market today is immense and includes, in broad strokes, mobile phones, tablet computers, e-readers, portable audio players and hand-held gaming consoles. Tomorrow the list will be different. To avoid the quicksand of semantic precision, UNESCO chooses to embrace a broad definition of mobile devices, recognizing simply that they are digital, easily portable, usually owned and controlled by an individual rather than an institution, can access the internet, have multimedia capabilities, and can facilitate a large number of tasks, particularly those related to communication.

Another defining attribute of mobile technology is its ubiquity. There are over 3.2 billion unique mobile phone subscribers worldwide, making mobile phones the most widely used interactive ICT on Earth. In developed countries 4 out of 5 people own and use a mobile phone, and while this ratio is significantly lower in developing countries (2:5), these countries are also experiencing the fastest growth in penetration rates. By 2017, it is estimated that approximately half the people living in developing countries will have at least one active mobile phone subscription (GSMA, 2012). Newer mobile technologies such as tablet computers are further changing the ICT landscape. Industry experts predict that the sales of touch-screen tablets are likely to parallel or surpass purchases of PCs as early as 2016 (NPD, 2012). Already several countries, including Turkey and Thailand, have announced ambitious plans to roll out tablet computers in schools.

Mobile learning is a branch of ICT in education. Yet, because it employs technology that is more affordable and more easily self-procured and managed than tethered computers, it requires reconceptualizing traditional models of technology use and implementation. Where computer and e-learning projects have historically been constrained by hardware that is expensive, fragile, heavy and kept in tightly controlled settings, mobile learning projects tend to assume that students have uninterrupted and largely unregulated access to technology. The ever-increasing availability of mobile technologies requires policy-makers to revisit and rethink the potentials of ICT in education. These guidelines seek to assist this endeavour by detailing several of the unique benefits of mobile learning and then articulating high-level policy recommendations.

UNIQUE BENEFITS OF MOBILE LEARNING

Far from being a theoretical possibility, mobile learning is an on-the-ground reality: students and teachers from Mozambique to Mongolia are using mobile devices to access rich educational content, converse and share information with other learners, elicit support from peers and instructors, and facilitate productive communication.

While mobile technology is not and never will be an educational panacea, it is a powerful and often overlooked tool – in a repertoire of other tools – that can support education in ways not possible before.

This section describes how mobile technologies can help UNESCO Member States now and in the future.

Expand the reach and equity of education

Today mobile technologies are often common even in areas where schools, books and computers are scarce. As the price of mobile phone ownership continues to decline, more and more people, including those in extremely impoverished areas, are likely to own and know how to use a mobile device.

A growing number of projects have shown that mobile technologies provide an excellent medium for extending educational opportunities to learners who may not have access to high-quality schooling. For example, the BridgeIT initiative in Latin America and Asia brings up-to-date content that supports inquiry-based learning pedagogies to geographically isolated schools via mobile networks. These networks provide internet access to institutions that do not have fixed-line connections. Another large project funded by the government of Colombia is providing inexpensive mobile devices equipped with educational software to 250,000 people in an effort to eradicate illiteracy. These projects improve educational equity by introducing new pathways for learning and improving existing educational offerings. By utilizing the unique affordances of mobile devices, these projects do not replace but rather complement existing educational investments such as textbooks, infrastructure, hardware, training and content.

Case Study

Launched in 2009, **Nokia Life** has brought information and educational opportunities to over 90 million people in India, China, Indonesia and Nigeria.

Users of the service select what learning content they would like to receive on their personal mobile handset from an extensive menu of options, covering topics in education, health, agriculture and entrepreneurship. Based on a user's preferences, the Nokia Life platform sends relevant information via richly formatted messages.

The service helps high school students prepare for examinations in different subjects, teaches farmers techniques to increase yields and negotiate fair prices for goods brought to market, and provides mothers increased knowledge about pregnancy and prenatal care. Other messages provide parenting advice; share information about HIV/AIDS, diabetes and other diseases; and give guidance to women interested in becoming economically active and starting small businesses. The learning content is personalized, available in eighteen different languages, and tailored to reflect the needs and culture of people living in different communities. Messages are developed with input from ninety knowledge partner organizations and carefully vetted by experts before dissemination.

Nokia Life brings reliable information to people who did not previously have access to digital knowledge services. In most markets, the service costs less than 1 US dollar per month, making it an affordable as well as easy-to-use portal to valuable information.

Facilitate personalized learning

Because mobile devices are generally owned by their users, highly customizable and carried throughout the day, they lend themselves to personalization in a way that shared and tethered technologies do not. Applications on mobile phones and tablets can, for example, select among harder or easier texts for reading assignments depending on the skills and background knowledge of an individual user. This technology helps ensure that students are not held back or left behind by larger groups. While PCs have offered similar affordances for years, this technology came with serious limitations: learners could not easily carry computers to and from educational centres, and many learners could not afford them, so the technology – even when it was available in computer labs – was not truly personal. Mobile technologies, by virtue of being highly portable and relatively inexpensive, have enormously expanded the potential and practicability of personalized learning.

Additionally, as the amount and type of information mobile devices can collect about their users increase, mobile technology will be better able to individualize learning. For instance, if a student is a visual learner with an interest in maps, historical information might be presented on an interactive atlas that can be manipulated on a touch-screen device. A student with different learning preferences might be presented similar information in a very different way, such as on a timeline indicating important events with links to informational videos and primary-source documents. Over time, personal technology will supersede one-size-fits-all models of education.

Cumulatively, intelligent mobile devices, many of which are already in the pockets of millions of people, can give students greater flexibility to move at their own pace and follow their own interests, potentially increasing their motivation to pursue learning opportunities.

Provide immediate feedback and assessment

A number of projects have demonstrated that mobile technologies can streamline assessments and provide learners and teachers more immediate indicators of progress. While historically learners have had to wait days or weeks to get guidance regarding their comprehension of curricular content, mobile technologies, thanks to their interactive features, can provide instant feedback. This allows learners to quickly pinpoint problems of understanding and review explanations of key concepts. A number of mathematics applications available for smartphones as well as basic mobile devices show learners, step-by-step, how to correctly solve questions they might have answered incorrectly. This functionality helps ensure that assessments are used to advance student learning rather than simply rank, reward and punish performance.

Mobile technologies can also make educators more efficient by automating the distribution, collection, evaluation and documentation of assessments. For example, a number of mobile applications make it easy for teachers to administer short quizzes to ensure that learners completed a given reading assignment. These programs typically support multiple operating systems, allowing learners to complete the quiz using their personal mobile device, rather than one provisioned by an institution. The quizzes can be assessed instantaneously and, when desired, synched to a grade book – no paper, red pens or laborious data entry necessary. By speeding up or eliminating tedious logistical tasks, educators can spend more time working directly with students.

Enable anytime, anywhere learning

Because people carry mobile devices with them most of the time, learning can happen at times and in places that were not previously conducive to education. Mobile learning applications commonly allow people to select between lessons that require only a few minutes to complete and lessons that demand sustained concentration over a period of hours. This flexibility allows people to study during a long break or while taking a short bus ride.

Mobile devices also have a track record of reinforcing retention of essential information. A number of applications – building on theories that human forgetfulness follows certain patterns – employ carefully calibrated logarithms to schedule reviews of concepts at optimal times, after information has been learned and just before it is likely to be forgotten, thereby facilitating the movement of information from short-term to long-term memory. In order for these programmes to work effectively, learners need to carry the technology with them throughout the day; mobility is crucial.

Case Study

The **UNESCO Mobile Literacy Project** used mobile phones to complement and support a traditional face-to-face literacy course offered to 250 adolescent girls living in remote areas of Pakistan. Illiteracy is an acute problem in Pakistan and disproportionately impacts women and girls. Across the country the adult literacy rate is 69% for males but only 40% for females. Because education research shows that newly acquired literacy skills quickly atrophy without consistent practice, UNESCO project planners wanted a way to support the girls remotely after they completed the course. The only way to communicate with participating students who lived in villages without computers or reliable fixed-line internet connections was via mobile phones. Programme instructors sent text messages to their students reminding them to practice handwriting skills or reread passages in a workbook. Instructors also posed questions to their students which the girls answered via text messages. All the activities and communication sought to reinforce the literacy skills the girls had gained during the in-person course. Before the UNESCO project incorporated mobile devices, only 28% of the girls who completed the literacy course earned an 'A' grade on a follow-up examination. However, with the mobile support over 60% of the girls earned an 'A' grade. Based on this initial success the project is currently being expanded and now reaches over 2,500 students.

Ensure the productive use of time spent in classrooms

UNESCO's investigations have revealed that mobile devices can help instructors use class time more effectively. When learners utilize mobile technology to complete passive or rote tasks such as listening to a lecture or memorizing information at home, they have more time to discuss ideas, share alternative interpretations, work collaboratively, and participate in laboratory activities at school and other learning centres. Far from heightening isolation, mobile learning allows people increased opportunities to cultivate the complex skills required to work productively with others.

A model gaining traction in North America 'flips' classrooms by asking learners to watch informational lectures outside of school – usually on mobile devices carried with learners wherever they are – so that more class time can be devoted to the application (as opposed to the mere transmission) of disciplinary concepts. Tasks that were once schoolwork become homework, and schoolwork places greater emphasis on the social aspects of learning.

Build new communities of learners

Mobile devices are regularly used to create communities of learners where they did not exist before. Yoza Cellphone Stories, a project in South Africa, allows young people to read and comment on short stories using inexpensive mobile phones, effectively creating a community of readers in areas where physical books are scarce. The Pink Phone project in Cambodia trains women leaders to use mobile handsets to share ideas, information and resources in a virtual space. Women draw on the expertise of females in their virtual network to assist people in their physical communities. Massive open online course systems or MOOCs have experimented with a variety of methods to encourage productive communication between learners taking the same class. Other platforms provide focused job training to students with similar vocational interests. Apart from making first-rate instruction available to far more people than traditional brick-and-mortar institutions can support, these systems – which are increasingly tailored for use on mobile devices – help students pose and answer questions, complete collaborative projects, and, more generally, engage in the social interactions foundational to learning.

Support situated learning

While formal education has historically been confined to the four walls of classrooms, mobile devices can move learning to settings that maximize understanding. Just as museums regularly offer 'audio guides' that allow visitors to learn about particular artefacts or works of art while viewing them in three dimensions, pioneering developers have made similar 'site-specific' mobile applications to facilitate learning in disciplines as varied as history and chemistry. A number of applications guide users through cities, pointing out important architectural landmarks and providing information about their design, construction and significance. Other applications allow botany students to learn about particular plants while inspecting them in their natural habitats. Mobile devices can, in essence, give literal meaning to the maxim 'the world is a classroom'.

In North America and Europe several projects have employed mobile devices to 'augment' reality. Relying on location-aware technology, devices reveal processes and structures in the physical world that cannot be seen visually. For example, software available on tablet computers helps engineers-in-training 'see' the location of structural supports inside specific bridges when they are observed from different angles in the field.

Case Study

The **Ecosystems Mobile Outdoor Blended Immersion Learning Environment** (EcoMOBILE) programme allows middle school students to learn more about the ecosystem of a pond. While on a field trip, students use their mobile devices to explore the areas surrounding specific ponds in North America. When they arrive at certain locations, they are asked questions, provided with resources and encouraged to collect data for further investigation. This interactive programme, made possible by the integration of GPS technology in mobile devices, dramatically changes the relationship between students and the environment they are studying and encourages high-level thinking, hands-on research and collaboration.

Enhance seamless learning

Cloud computing and cloud storage streamline education by providing students continuous and up-to-date learning experiences regardless of the hardware they use to access content. Because educational resources and information about a learner's progress are stored on remote servers rather than on the hard drive of a single device, students can access similar material from a wide variety of devices (including desktop computers, laptops, tablets and mobile phones), utilizing the comparative advantages of each. For example, a tethered computer with a large screen and full-sized keyboard might be better for composing essays and conducting extensive internet research, whereas a mobile device might be superior for inputting bits of information collected in the field and noting exploratory ideas. Software is able to synchronize work across devices, so students can pick up on a mobile device where they left off on a desktop computer and vice versa, thereby ensuring continuity of the learning experience. Also, because computing is increasingly moving to the cloud, devices do not necessarily need expensive processors to utilize sophisticated software; they simply need to provide a learner a connection to the internet.

Bridge formal and informal learning

Mobile devices facilitate learning by blurring boundaries between formal and informal education. Using a mobile device, students can easily access supplementary materials in order to clarify ideas introduced by a classroom instructor. As an illustration, numerous language learning applications 'speak' to students and 'listen' to them via the speakers and microphone embedded in mobile phones. Previously, this type of speaking and listening practice required the presence of a teacher. Additionally, learners who strike up conversations with people fluent in a target language can use a mobile device to translate the meaning of unfamiliar words and phrases, thus supporting communication. The mobility and relative unobtrusiveness of the device makes this process fairly straightforward; it does not disrupt conversation in the same way that a paper-and-ink dictionary or laptop computer might. Many translation applications allow learners to flag difficult words for later review, and confusing word combinations can be brought to the attention of a classroom instructor at a later date. Mobile technology helps ensure that learning which happens inside and outside classrooms is mutually supportive.

Minimize educational disruption in conflict and disaster areas

Because mobile infrastructure is generally easier and quicker to repair following a disaster or conflict than other infrastructure, such as roads and physical schools, mobile learning holds special application for learners living in post-crisis areas. For example, in the aftermath of a flood or war students can in many instances utilize educational resources and connect with teachers and peers via mobile devices, even when traditional schools and universities are closed or unsafe. Research has indicated that mitigating educational disruptions in post-conflict and post-disaster areas speeds up recoveries and helps heal fragile societies. Mobile devices can help ensure the continuation and continuity of education during times of crisis.

Assist learners with disabilities

Thanks to the integration of text-enlargement, voice-transcription, location-aware and text-to-speech technologies, mobile devices can dramatically improve the learning of students with physical disabilities, in resource-poor and resource-rich communities alike. The Cambridge to Africa Network, for example, recently launched a programme that encourages the participation of deaf children enrolled in Ugandan schools. Students use mobile devices and an innovative SMS system to gain access to the curriculum and interact with peers. For visually impaired learners, freely available software can, for example, turn a mobile phone equipped with a camera into a tool that reads text aloud. Mobile technology can also aid students with learning disabilities. Researchers at the Harvard-Smithsonian Center for Astrophysics recently discovered that text can be reformatted on small-screen digital devices to improve the reading speed and comprehension of individuals with dyslexia. Findings like these have prompted the creation of mobile applications tailored for people who struggle to read due to a disability.

Improve communication and administration

Because messages sent by mobile devices are generally faster, more reliable, more efficient and less expensive than alternative channels of communication, learners and educators are increasingly using them to facilitate the exchange of information.

Besides being more likely to reach intended recipients than paper-and-ink leaflets, messages sent via mobile technology can be used to elicit as well as disseminate information. Teachers can ask students to provide feedback on assignments, and parents can request up-to-the-minute information about the academic progress of a child.

Additionally, a number of projects active in Asia, Africa and North America rely on mobile phones to streamline communication between classroom instructors who teach similar disciplines or groups of students. In South Africa instructors involved in the Teaching Biology Project used social media platforms to share lesson plans and pedagogical ideas via mobile phones. Teachers involved in this project reported that it helped instil a sense of professionalism and camaraderie and made it easier for them to request assistance from peers who understood the day-to-day exigencies of their job.

Case Study

In many countries communication between schools and the district, state or national educational bodies that administer them is slow and unreliable, resulting in a dearth of information about schools and student performance needed to detect problems and address them. To respond to these challenges, the Argentine province of Salta recently launched an initiative called **Proyecto Gema** (Gestión para la Mejora de los Aprendizajes) with technical cooperation from UNICEF. The programme is aimed at improving student learning results by developing evidence-based managing capacities at the school and administrative levels. One of its central components is a system that queries school data (e.g. dropout rates and student and teacher attendance) through a monthly series of automated SMS messages sent to school principals in remote areas. The principals' answers are automatically recorded and processed by an online education management information system that produces reports and notifies officials about critical situations that demand support for specific schools. This initiative and others like it have improved decision-making by making higher quality data available to administrators in a timely and cost-efficient manner.

Maximize cost-efficiency

When weighed against the costs of comparable educational resources, mobile technology can offer good value. For example, Thailand recently launched an initiative to provide students with tablet computers and plans to gradually phase out traditional textbooks. While this project is expensive in absolute terms, it must be balanced against the costs of purchasing, procuring, delivering and updating physical textbooks. Similarly, the functionality and limitations of tablet devices versus paper books need to be compared and contrasted. Although long-term cost–benefit analyses still need to be conducted to compare the total costs of paper versus digital textbooks, early signs indicate that mobile devices may maximize cost-efficiency by offering rich feature sets at increasingly low prices.

Many governments have successfully expanded educational opportunities by leveraging the technology people already own, rather than providing new devices. Initiatives that transform ubiquitous mobile devices into tools for learning, while ensuring equity of opportunity for students who cannot afford them, generally provide affordable solutions to educational challenges.

POLICY GUIDELINES FOR MOBILE LEARNING

In order to realize the unique benefits of mobile learning, UNESCO recommends that policy-makers take the actions described in this section.

Create or update policies related to mobile learning

Because most ICT in education policies were articulated in a 'pre-mobile' era, they do not seek to maximize the learning potentials of mobile technology. The rare policies that do reference mobile devices tend to treat them tangentially or ban their use in schools. Newly developed policy directives related to mobile learning should be embedded within existing ICT in education policies, which many governments already have in place. In order to leverage the opportunities afforded by mobile technology and other new ICTs, education officials may need to review existing policies.

POLICY RECOMMENDATIONS

- **Examine** the unique educational potentials and challenges offered by mobile technology and, when appropriate, incorporate these understandings into broader ICT in education policies.

- **Avoid** blanket prohibitions of mobile devices. Universal bans, unless implemented for well-considered reasons, are blunt instruments that usually obstruct educational opportunities and inhibit innovation in teaching and learning.

- **Provide** guidance on how new investments in technology can work in conjunction with existing educational investments and initiatives.

Train teachers to advance learning through mobile technologies

To capitalize on the advantages of mobile technologies, teachers need to be trained to successfully incorporate them into pedagogical practice. In many instances, a government's investment in teacher training is more important than its investment in technology itself. UNESCO's research has shown that without guidance and instruction teachers will often use technology to 'do old things in new ways' rather than transform and improve approaches to teaching and learning.

POLICY RECOMMENDATIONS

- **Prioritize** the professional development of teachers. The success of mobile learning hinges on the ability of teachers to maximize the educational advantages of mobile devices.

- **Provide** necessary technical and well as pedagogical training to teachers when introducing mobile learning solutions and opportunities. While many teachers know how to use mobile devices, many do not, and as devices grow more versatile and complex they tend to become more difficult to use.

- **Encourage** teacher training institutes to incorporate mobile learning into their programmes and curricula.

- **Provide** opportunities for educators to share strategies for effectively integrating technology in institutions with similar resources and needs.

Provide support and training to teachers through mobile technologies

UNESCO has found that very few education systems use mobile technologies to support the work and development of teachers, even though this is often a practical and cost-effective method to assist educators, especially those working in remote and resource-poor areas. Mobile devices can also help move teacher training away from homogenous and centralized institutions and towards the classrooms and school sites where learners and educators come together. With the ability to access curricular content remotely, aspiring teachers can spend more time practicing pedagogy in authentic environments. And just as mobile devices can tailor learning materials for students, they can also ensure that teachers study concepts relevant to particular disciplines, schools and student populations. One-size-fits-all approaches to professional training are insufficient for teachers as well as students, and mobile learning offers a promising avenue to better personalize curriculum and instruction for both groups.

POLICY RECOMMENDATIONS

- **Ensure** that, where possible, curriculum, educational resources and lesson plans are available to teachers via mobile devices. While many mobile learning projects make resources available to students, very few target teachers specifically.

- **Explore** the practicability of providing professional development and teacher training via mobile technology. This approach can complement but should not replace the face-to-face training usually necessary to truly change teachers' beliefs and improve their practice.

Create and optimize educational content for use on mobile devices

Currently most educational content, including digital content, is not accessible from mobile devices, nor does it take full advantage of the unique multimedia, communication and sometimes location-aware capabilities of these devices. Also, even when content is available, it often lacks relevance to local student populations due to limited language options or a dearth of culturally-specific material. Additionally, a great deal of content fails to follow standards or incorporate features that improve accessibility for students with disabilities. By tailoring appropriate resources for use on mobile devices while ensuring their relevance and accessibility to diverse student populations, educators can vastly extend the reach of these resources, because far more learners and teachers own mobile devices than laptop or desktop computers.

POLICY RECOMMENDATIONS

- **Ensure** that educational resources and content, including existing online repositories, are easily accessible from mobile devices.

- **Support** the open licensing of mobile content to facilitate its widest possible use and adaptation. This can be accomplished by supporting the use of open educational resources or OERs.

- **Create** incentives for developers to build content specifically for mobile devices. While it is possible to 'migrate' learning materials from computers and textbooks to mobile technology, designers need to 'think mobile first', making hard choices about how to streamline content for presentation and use on devices with small screens and limited input options.

- **Encourage** the development of platforms or software that allow classroom teachers (and others with first-hand knowledge of students) to create or tailor mobile content.

- **Promote** the creation of mobile content that is relevant to local groups and accessible in local languages. This can be accomplished by inviting local developers to build mobile learning content for their communities.

- **Advocate** for standards that make mobile hardware, software and content accessible to diverse student populations, including students with disabilities.

Ensure gender equality for mobile students

UNESCO promotes the right of all women and men, girls and boys to a quality education that meets basic learning needs and enriches lives. While mobile phones have empowered women and girls in educational, social and economic ways, approximately 300 million more men own mobile phones in low to middle-income countries than women (GSMA et al., 2010). Men are also more likely to know how to use mobile technology than women. The mobile phone gender gap is a symptom of broader gender inequalities, apparent in education as well as in the general use and ownership of ICTs. Policy-makers should work to promote gender equality for mobile learning.

POLICY RECOMMENDATIONS

- **Ameliorate** existing ICT in education gender gaps by encouraging women and girls as well as men and boys to leverage mobile technology for learning.
- **Identify** culturally relevant ways of normalizing mobile phone ownership and use for women and girls in particular.
- **Develop** strategies to teach women and girls as well as men and boys relevant ICT skills.

Expand and improve connectivity options while ensuring equity

Most mobile learning opportunities depend on reliable connectivity to the internet and other communication and data networks. As access to information becomes increasingly tied to economic and social development, governments should work with relevant industries to build and augment the technological infrastructure that powers mobile learning. It is also crucial that governments seek to provide equal access to mobile connectivity. A student who cannot use a mobile network – whether because of economic or geographic reasons – is denied access to an impressive and growing range of learning possibilities.

POLICY RECOMMENDATIONS

- **Take** stock of existing ICT infrastructure and establish realistic targets for improving this infrastructure incrementally, devoting particular attention to underserved areas.

- **Support** the provision of robust and affordable mobile networks within and across communities, especially in educational institutions such as schools, universities and libraries.

- **Consider** providing full or partial subsidies for access to mobile data and broadband services. Many governments offer 'e-rate' subsidies to promote internet access for educational purposes via computers. In addition, governments should now consider advocating for 'm-rate' subsidies to promote mobile access to the internet.

- **Support** efforts to build local and ad hoc networks to support mobile learning, especially in settings where larger networks are unavailable.

Develop strategies to provide equal access for all

Mobile devices hold special promise for education, in large part because a majority of people already have access to one. Collectively, they are the most ubiquitous interactive ICT on the planet. While governments should seek to enlarge learning opportunities for the huge number of people who own a personal mobile device, they also need to ensure mobile learning opportunities remain open to learners who do not have a device.

Currently there are three widely practiced models for ensuring people have the hardware needed for mobile learning:

1) governments or other institutions provide devices directly to learners;
2) learners supply their own devices, commonly referred to as 'bring your own device' or BYOD; or
3) governments and institutions share provisioning responsibilities with learners.

The BYOD model is attractive because it is inexpensive: the costs of the devices, their maintenance and their connectivity plans are usually shouldered by learners. As a result, BYOD projects can be implemented quickly in areas where most people have mobile devices. However, BYOD has serious limitations if it fails to accommodate learners who do not already own mobile hardware. It can also create scenarios where learners with superior devices and connectivity plans can outperform those with inferior devices and plans.

POLICY RECOMMENDATIONS

▪▫▫ **Ensure** equal access to mobile technology and participation in mobile learning for all students and teachers. In the case of BYOD implementations, governments should adopt measures to provide mobile hardware and connectivity to learners who do not have a personal device.

▪▫▫ **Allow** students to 'own' their mobile device whenever possible. A principal advantage of mobile learning is that it opens up educational opportunities inside and outside of schools. If students cannot take full ownership of their devices, they are unlikely to adopt them as personalized learning tools and use them in informal contexts.

▪▫▫ **Encourage** government departments and educational institutions to negotiate with vendors and leverage the purchasing power of large numbers of learners.

Promote the safe, responsible and healthy use of mobile technologies

Like any ICT, mobile technology can be used to access inappropriate material. In the wrong hands mobile devices can also enable undesirable behaviour – such as bullying, sending violent or sexually explicit messages, and interacting with dangerous individuals – which may exacerbate gender and other inequalities. However, because mobile technologies are often overlooked or prohibited in schools, educators have not had opportunities to teach students how to use them responsibly. Schools are well-placed to provide guidance on the appropriate and productive uses of mobile devices and, in many instances, students are unlikely to get this guidance elsewhere. Data reviewed by UNESCO overwhelmingly indicates that banning mobile technologies in formal systems of education does not prevent young people from using them. Rather, schools should increase student awareness about using mobile devices safely and avoiding the inherent hazards of open access to communication and information, including over-use and internet addiction.

Finally, there are concerns around potential health risks associated with the use of mobile technologies, including eye strain from working on small screens and exposure to electromagnetic radiation. While most research has concluded that mobile technologies are safe, alleged health risks, especially those stemming from long-term use, should be actively researched (WHO, 2011).

POLICY RECOMMENDATIONS

- **Promote** the responsible use of mobile devices by teaching digital citizenship.

- **Adopt** 'responsible use policies' (RUPs) instead of 'acceptable use policies' (AUPs). RUPs help highlight and reinforce healthy habits while simultaneously ensuring that educators are not forced to police mobile technology use, a task that is largely futile for classroom instructors who may see hundreds of students over the course of a single day.

- **Articulate** strategies to balance online interaction with offline interaction in contexts where excessive screen time and over-use of ICTs are serious concerns. Also, distinguish what constitutes productive and unproductive or healthy and unhealthy screen time.

- **Stay** abreast of research surrounding potential health risks associated with mobile technologies.

Use mobile technology to improve communication and education management

Mobile technology has a track record of making educational administration more efficient, as well as improving communication between schools, teachers, students and parents. By streamlining tasks such as recording attendance and assessment results, mobile technologies allow educators more time to focus on instruction. Mobile devices also facilitate data gathering and improve education management, especially in education systems where fixed-line internet access is unavailable.

POLICY RECOMMENDATIONS

- **Promote** the 'system strengthening' uses of mobile technologies.

- **Encourage** schools and individual educators to communicate with students and parents via mobile devices.

- **Extend** the reach and effectiveness of education management and information systems by integrating support for mobile technologies.

- **Consider** how mobile technologies can support the collection of educational information following a conflict or disaster.

Raise awareness of mobile learning through advocacy, leadership and dialogue

Negative social attitudes regarding the educational potentials of mobile technology constitute the most immediate barrier to the widespread embrace of mobile learning. Broadly speaking, people tend to view mobile devices (and mobile phones in particular) as portals to entertainment, not education, and as a result this technology is regularly dismissed as distracting or disruptive in school settings. Historically, the small screen sizes and awkward input methods on mobile devices have also been seen as disadvantages to their use in education. While these views are changing – largely due to impressive technological advances and the advent of larger-screen tablet computers – policy-makers can also take steps to educate the public about the benefits of mobile learning.

POLICY RECOMMENDATIONS

- **Highlight** and model how mobile technology can improve teaching, learning and administration.

- **Share** research findings and evaluations of mobile learning programmes.

- **Encourage** dialogue among key stakeholders – including principals, teachers, learners, parents, local leaders and community-based organizations – about mobile learning.

- **Provide** a coherent vision of how technology, including mobile technologies, will further learning goals.

CONCLUSION

This year the number of connected mobile devices, the vast majority of which are mobile phones, will surpass the world's population for the first time in history. Yet despite their ubiquity and the unique types of learning they support, these technologies are often prohibited or ignored in formal systems of education.

This represents a missed opportunity. The learning potentials of mobile devices are impressive and, in many instances, well-established. While hardly a cure-all, they can meaningfully address a number of pressing educational challenges in new and cost-effective ways.

In a world that is increasingly reliant on connectivity and access to information, mobile devices are not a passing fad. As mobile technologies continue to grow in power and functionality, their utility as educational tools is likely to expand and, with it, their centrality to formal as well as informal education. For these reasons, UNESCO believes that mobile learning deserves the careful consideration of policy-makers.

ADDITIONAL RESOURCES

UNESCO has assembled a list of complementary resources to share information about mobile learning and facilitate the creation of policies that maximize the educational advantages of mobile technologies. For more information, please see the UNESCO website at: http://www.unesco.org/education/mlearning-resources/

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For the first time in history, there are more mobile phones and tablet computers on the planet than there are people.

Due to their utility, ease-of-use and affordability, these devices are well-placed to expand educational opportunities for learners in diverse contexts, including areas where traditional education resources are scarce. But how is this best accomplished?

How can mobile technologies be leveraged to assist teaching and learning?

The UNESCO Policy Guidelines for Mobile Learning answer these questions directly. They provide both a rationale and a roadmap for policy-makers and others seeking to transform increasingly ubiquitous mobile devices into tools for education.

Drawing on UNESCO's fourteen-paper series on mobile learning and nearly two years of research, the Guidelines – the first of their kind – describe the unique benefits of mobile learning and articulate strategies to build enabling policy environments in which these benefits can take root and grow.

Mobile technologies have fundamentally changed the way people live. With sound policy decisions, they can also improve the way people learn.