



United Nations
Educational, Scientific and
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UNESCO Guidelines for Digital Inclusion for Low-skilled and Low-literate People

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INTRODUCTION

In an increasingly online world, people need digital skills to work, live and communicate productively. Those without the required skills and literacy now face a double exclusion, not only from the real world but also from the digital one. There is a need to both develop the necessary digital skills and literacy amongst this group, as well as create inclusive digital solutions and resources that are suitable for the skills levels they have today.

The guidelines provide a set of recommendations to follow when designing, building and implementing digital solutions for greater inclusion and development of people with low skills¹ and low literacy². The solution could be an app to improve farming practices in Uganda, an online registration website for Syrian refugees in Turkey or a maternal health SMS service in India. These digital tools and services, if designed appropriately, can provide an entry point for low-skilled and low-literate people into digital usage and can support improved livelihoods and skills development.

There are a number of existing toolkits that offer proven practices for creating digital solutions for development, covering the whole product development cycle. Examples include the Principles for Digital Development and toolkits from the GSMA and IDEO.³ In a way that complements and extends existing resources, UNESCO aims to focus the lens on low-skilled and low-literate users as much as possible here.

The guidelines were developed in consultation with an international expert group as well as with public input to ensure they contain a broad set of perspectives.

Target audience

The primary target audience for the guidelines are digital solution providers – from large providers such as Google and Facebook, to start-ups – as well as implementation and development partners, such as FAO, GIZ, UNICEF and USAID, who can shape the terms of reference for digital solution development.

The secondary audience includes policy makers – for using the guidelines to create inclusive policies and regulatory frameworks – and mobile network operators and technology providers – for creating enabling environments for greater digital inclusion for all.

How to use the guidelines

The target audience is encouraged to implement UNESCO's guidelines at appropriate points in the digital product development cycle, tailoring them as necessary to reflect the unique needs and on-the-ground realities of local contexts.

It is recommended that these guidelines be read alongside the UNESCO landscape review *Digital Inclusion for Low-skilled and Low-literate People* and the accompanying set of fourteen case studies.⁴ The case studies, some of which are highlighted here, offer an in-depth review of projects that implement many of these guidelines and offer practical tips, insights and recommendations. A growing collection of external resources is also being developed.⁵

RATIONALE FOR THE GUIDELINES

Barriers to digital inclusion

Almost half the world's population is online, which is a major achievement. It also means there is still much work to be done. The next four billion users look different to those already benefitting from digital opportunities. Fundamentally different strategies are needed. Globally, the offline population is disproportionately rural, poor, elderly and female. Offline people often have limited education, low literacy⁶ and typically hold informal sector jobs.

¹ It is recognized that any person possesses many skills, and can be low-skilled in one area of life, for example, digital know-how, but highly skilled in a different domain, such as maize farming. While the term low-skilled is thus somewhat simplistic, it is broadly used in this sense to refer to people who have limited skills needed to participate in digital activities.

² In reality, people can have low skills and/or low literacy. However, for the purposes of ease of reading, the guidelines refers to people with both low skills and low literacy.

³ See digitalprinciples.org, www.gsma.com/mobilefordevelopment and www.designkit.org, respectively

⁴ See en.unesco.org/themes/literacy-all/pearson-initiative

⁵ See bit.ly/unesco-resources

⁶ Sprague et al. 2014. *Offline and falling behind: Barriers to Internet adoption*.

There are four major barriers to digital inclusion⁷: lack of infrastructure; low incomes and affordability; limited user capabilities; and lack of incentives to go online.

While the first two barriers are critical to address, they largely fall outside of the scope of these guidelines. Limited user capabilities are seen in the 750 million people who cannot read or write⁸ and the two billion people who are semi-literate. Beyond literacy abilities, most adults in low- and middle-income countries do not have even basic digital skills and competences.⁹ Across Africa, seven in ten people who do not use the internet say they just don't know how to use it.¹⁰ Even in Europe, 19 per cent of adults lack the literacy skills, and 45% lack the basic digital skills, needed to function fully in a modern society.¹¹

Lack of incentives are another factor and include limited cultural and social acceptance of internet use, low awareness and understanding of the internet, and not enough available and relevant local content.

Of course people who are low-literate and low-skilled do not constitute a homogeneous group, and do not tick all of the "offline" boxes. However, it is useful to recognise key characteristics of this group.

While the major barriers need to be addressed in a holistic manner, a two-pronged approach is needed: simultaneously work on improving the education, literacy and digital skills of users, as well as design relevant and usable digital solutions that are inclusive of the full range of skill levels.

Reasons for focusing on low-skilled and low-literate people

There are three main reasons to focus on the digital inclusion of low-skilled and low-literate people:

Developmental reasons. In the digital age, more than ever, literacy is the critical first step in the lifelong learning journey to improved quality of life, livelihood and work. The Sustainable Development Goals (SDGs) devote renewed attention to the importance of literacy by aiming to ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy by 2030 (target 4.6). Further, given the importance of having the skills and competences needed to use technology and benefit from its growing utility, digital skills is an indicator for the goal of increasing the number of youth and adults with relevant skills – including technical and vocational skills offered by TVET institutions – for employment, decent jobs and entrepreneurship (target 4.4). The Broadband Commission for Sustainable Development, co-founded by UNESCO, has set a target that by 2025, 60% of youth and adults should have achieved at least a minimum level of proficiency in sustainable digital skills.

By developing digital solutions for women and rural users, these groups that are traditionally underserved can be included in skills and livelihoods development.

Economic and usage reasons. Users with mobile digital skills are higher data users and have the confidence to move beyond a limited set of application "islands" to more widespread use of mobile apps and services.¹² As users become more digitally skilled they also teach others how to use the technology, creating a ripple effect that drives further uptake.¹³ Thus, more skills presents the opportunity for increased engagement, higher numbers of users and, if services are paid-for or data drives revenue, greater earnings.

Literacy reason. A 'literate environment' refers to the contexts, conditions and opportunities that are particularly stimulating and supportive of the acquisition and use of literacy skills.¹⁴ It is important to regard digital solutions as enriching the literate environment in the sense that they offer opportunities for learning and practising digital skills and literacy. This is called the "supply side" of the literate environment, which also includes the world of print media and institutions such as schools, community groups and adult learning centres that support literacy development.

⁷ Schmida, S., Bernard, J., Zakaras, T., Lovegrove, C. and Swingle, C. 2017. *Connecting the Next Four Billion: Strengthening the Global Response for Universal Internet Access*.

⁸ Montoya, S. 2017. *Tracking Literacy in an Increasingly Digital World*.

⁹ UNESCO. 2017. *Global Education Monitoring Report 2017/8, Accountability in Education: Meeting Our Commitments*.

¹⁰ World Bank. 2016. *World Development Report 2016: Digital Dividends*.

¹¹ OECD. 2016. *The Survey of Adult Skills: Reader's Companion, 2nd edn*.

¹² GSMA. 2017. *Mobile Internet Skills Training Toolkit: Tigo Rwanda Pilot Evaluation*.

¹³ Donner, J., Gitau, S. and Marsden, G. 2011. *Exploring Mobile-only Internet Use: Results of a Training Study in Urban South Africa*.

¹⁴ UNESCO Institute for Lifelong Learning. 2017. *Fostering a culture of reading and writing*.

On the demand side, if they add value to people's lives through improved livelihoods, communication or even entertainment, digital solutions increase the motivation to learn literacy skills in the first place. The use of technology can also be driven by aspirations and social pressures to "get online" and join social networks.^(10, GSMA Rwanda, 15) Overall, digital technologies are becoming significant factors in enriching the literate environment from the demand as well as the supply side in sub-Saharan Africa.¹⁶

While digital solutions aimed at low-literate populations are not always focused on enhancing literacy *per se*, they play a part in creating demand for gaining that skill. Where they do offer text, that of course does contribute to literacy practice, even if in small ways. And when people can create content through digital tools they are certainly engaging in literate practises. It should be noted, though, that digital solutions should not replace traditional efforts to develop literacy skills and should be seen as complements to many literacy supports, including print media.

Theory of change

Acknowledging the barriers to greater digital inclusion and the reasons for addressing them for low-skilled and low-literate users, UNESCO proposes the following theory of change:

IF appropriately designed to meet the needs of, and be usable by, people who are low-skilled and low-literate, digital solutions provide an entry point for this group into digital activities.

THEN as low-skilled and low-literate people increasingly use inclusive digital solutions their digital skills – and even literacy – are developed over time.

WHICH enables low-skilled and low-literate people to use technology in ways that improves their livelihoods.

WHICH IS LIKELY to raise their motivation and confidence to more deeply use technology, creating a virtuous circle of increased usage, skills development, improved livelihoods and, overall, greater digital inclusion.

General characteristics of low-skilled and low-literate people and technology

As context to the guidelines, it is useful to note that despite the many variances across and within communities, and while every user is unique, research¹⁷ has revealed general characteristics of how some low-skilled and low-literate people use technology. These traits are common enough to mention and certain ones may apply to the particular audience being targeted.

Low-literacy is not just an inability to read. Research suggests that low exposure to education means some cognitive skills needed for digital interaction can be underdeveloped. For example, low-literate users can struggle with transferring learning from one setting to another, such as from online instructional videos to implementation in real life. Secondly, conceptualising and navigating information hierarchies – such as app menus – can be more challenging than for well-educated users.

Low-literate users are scared and sceptical of technology. Unsurprisingly, low literate users are often not confident in their use of digital devices. What this means is that they are scared of touching the technology for fear of breaking it. Even if they don't break it, they might be seen as not knowing how to use it, causing embarrassment. When they do use technology, they can be easily confused by the user interface (UI).

Further, low-literate users can lack awareness of what digital can deliver, mistrust the technology and doubt that it holds information relevant to their lives.

Low-literate users are often basic-level users. Low literate users mostly make voice call on mobile phones, which are often basic handsets. They have limited experience of using PCs. Typically, their technology experience is at a limited level.

Low-literate users don't use technology alone. Low-income people often live in close-knit communities. Social norms and hierarchies influence who has access to technology, how information flows between community members and who is trusted. The ecosystem around the user has a profound influence on digital usage.

¹⁵ De Reynal, L. and Richter, B. 2016. *Stepping Into Digital Life*.

¹⁶ Easton, P. 2014. *Sustaining Literacy in Africa: Developing a Literate Environment*.

¹⁷ Thies, I. 2015. *User Interface Design for Low-literate and Novice Users: Past, Present and Future*.

Living spaces are typically small for a sizable number of people. Within families, devices are often shared, which impacts on user privacy.

At the same time, such communal living also creates opportunities for peer-to-peer or group learning. When low-literate people use the device it may be necessary to involve trusted intermediaries, or "infomediaries" in digital parlance, to assist, such as read messages, navigate the UI or troubleshoot the tech. These infomediaries are often younger family members or close community members.

Infomediaries can also hinder the experience when their "filtering and funnelling decisions limit the low-literate users' information-seeking behaviour."

The implication is that the "target user" is really plural – the node and all the people around him/her. The digital solution is really for multiple users and to be used in group or mediated scenarios.

Low-literate users are divided by gender. Two thirds of the world's illiterate population are women.¹⁸ They generally use fewer mobile services than men.¹⁹ In South Asia women are 38% less likely than men to own a mobile phone, and are therefore more likely to be "sharing" users. Husbands can be gate-keepers to their wives' mobile usage, and cultural, societal or religious norms can restrict digital access for women, deepening the gender digital divide. When it comes to digital skills, women are 1.6 times more likely than men to report it as a factor limiting their use of the internet²⁰. In short, for low-literate and low-income users, gender matters.

Low-literate users are driven by motivation. While successful digital usage is often attributed to good UI, research has shown that motivation is a strong driver for task completion. This is true for all people, but especially relevant when task completion is challenging. For example, despite minimum technical knowledge, urban youth in India hungry for entertainment content traversed as many as 19 steps to Bluetooth transfer music, videos and comedy clips between phones and PCs. In terms of livelihoods and living, the desire to sell crops for more, raise healthier children, access government grants or apply for a visa, are the kinds of motivators that need to be tapped to engage low-literate users.

Each of the above traits has implications for designing and implementing digital solutions, as explored in the guidelines.

GUIDELINES

Drawing on the general characteristics of how low-skilled and low-literate people use technology, and the need for skills development, the following guidelines and recommendations offer a pathway to designing and implementing digital solutions that are more inclusive for users that need the most support. The guidelines are aligned to the processes and phases of the standard product development life cycle.

Design with all the users, focusing on their needs and context

For developers of digital solutions for users with low levels of skills and literacy, it is crucial to gain a deep understanding of the target users and follow proven practices to design with – not for – them, in a manner sensitive to particular challenges. If digital solutions are not driven by real needs and are not appropriate to users' contexts, they will not be relevant, usable and beneficial.

RECOMMENDATION: Understand the users and their ecosystem

The first step to developing appropriate digital solutions is understanding the target user or, especially in the case of low-skilled and low-literate people, the target users. Developing a sense of empathy for the lives of these users can be especially challenging when developing solutions for people who live in completely different worlds, literally and figuratively.

Beyond general characteristics, to deeply understand the particular users of a digital solution, it is necessary to spend time to get to know them: their family, community and culture; their working contexts; their needs and pain points; and their motivations. Asking the **right questions** will reveal a good picture of the users and their ecosystem, for example:

¹⁸ UNESCO Institute for Statistics. 2017. *Literacy Rates Continue to Rise from One Generation to the Next*.

¹⁹ GSMA. 2017. *GSMA mHealth Gender Toolkit: Key principles and tips for reaching women*.

²⁰ Worldwide Web Foundation. 2016. *Women's Rights Online Digital Gender Gap Audit*.

Core target user(s)

- Who is the **core target user**, the person for whom the service and information is directly intended to benefit, and who interacts most with it? Across a digital platform with many touch points, this **can be more than one person**. For example, the same digital solution may send a mother maternal health SMS as well as allow a district health official to view an analysis of the number of messages sent and responded to over time.
- For each target user, what are his or her **demographics**? For example, what are his or her education and literacy levels? What are his or her **technology usage and digital competences** (the focus of the next guideline)?
- What are his or her **needs** and how are they currently being met, or not? What are his or her **behaviours and daily routine** with regard to the particular need being addressed? What or who are **knowledge sources**? What are the bottlenecks? Most importantly, what **motivates** him or her to meet the need?

Human circle

- Who are the **secondary, influencing users**? In other words, what is the human circle around the target user? For low-skilled and low-literate users in particular, it is critical to establish these **human connections**, the set of complementary actors to the core users' digital usage and skills development.
- Since low-literate people often rely heavily on others around them for information and help using technology, it is useful to ask how he or she **navigates technology and written text**? Who does he or she consume content with – the **"infomediaries"** or technology proximates – and what role do they play?
- Who **influences behaviour**, for example, a woman's husband may filter her information access or a community leader may support digital classes for all?
- Who are the **trusted people and agents** in the community? In sum, who else around the target user(s) need to be considered in the understanding and design of the solution.

Influencing environment

- What are the **influencing factors** that affect, for example, technology usage, information flows and daily activities? Factors include traditions and customs, culture, social norms, setting (urban or rural), technology infrastructure and economics.

RECOMMENDATION: Follow best practice user-centered design approaches

There are many tools and practises to help answer the questions above and to really design with users. A core principle across all resources is putting the user at the centre of the process. User-centered design is an approach to digital solution development that is driven by the needs, capabilities and context of its users. In the research it is necessary to engage the broad human network around the target users, for example, husbands or wives, caregivers, community leaders, or colleagues and superiors.

The following recommended activities, mostly undertaken with the end users, are common in good user-centered design:

- **Conduct desk research** to deepen the broad understanding of the users and their context. For example, noting at a national level the literacy rates and mobile uptake statistics.
- **Create user personas**, which are fictitious characterisations that capture, in a relatable way, the key attributes, demographics and motivations of the target users.
- **Draw a user journey map** of the end-to-end activities and processes of the users to show the full set of steps and possible paths to achieve a particular outcome. A user journey map is useful for highlighting broad user pain points, barriers and opportunities. It informs not only what will become the digital solution, but also related issues, such as the user onboarding process.
- **Develop user scenarios** for key moments in the user journey, which detail specific user needs in clear, action-oriented “stories”. User stories simply describe what users need to do and why. It is critical that users validate the stories written by the solution development team to ensure they correctly capture reality.
- **Map the ecosystem** to identify and understand all the stakeholders and factors that must be considered in the whole solution design. Community involvement is useful in creating the ecosystem map.
- **Design low-level and, later, more-detailed prototypes** of the digital solution. Paper-prototypes or low-level wireframes are a very cheap and proven way to quickly **test with users** and get feedback on the UI, the navigation elements and the language used.
- **Test content**, a critical component of the design process – described in the next guideline.

Case study: Take a design journey with the users

The **Khushi Baby** initiative uses mobile technology and a wearable digital necklace to provide effective tracking of maternal and child health-care data in India.

In addition to supporting mothers, the service supports the work of community health workers (CHWs) – often low-literate and with low digital skills – and generates data for district-level decision-making related to health administration.

The team behind Khushi Baby were students at Yale University in the USA. In order to understand the needs and local context for the solution, team members spent two months living in rural Udaipur, India, while accompanying nurses from a local implementing partner.

The entire user-centered design journey has been documented and includes key findings from the field studies, paper prototypes and wireframes, early solution designs, user testing feedback and ongoing solution iterations.

See bit.ly/khushibabydesign

A key principle of user-centered design is **iteration**. Based on initial understandings and research, prototypes are developed which users try and give feedback on. The design is adjusted accordingly and the process is repeated until the solution sufficiently meets the user needs. Such an incremental approach is key for keeping a short design-test-adjust validation loop.

Case study: Actively involve users in developing the solution

MOPA is a citizen reporting and monitoring platform for waste collection in Maputo, Mozambique, created by UX Information Technologies and the Maputo Municipal Council.

Four types of workshops were held to gather user-oriented design insights, validate workflow systems, and collect ideas for improving the service.

Insight workshops helped unpack the complex system of solid waste management in the city and the roles of the actors involved.

Collection workshops emphasized functioning sources of data and gaps that needed to be filled for service optimization. These workshops led to a campaign of mapping physical collection sites in Maputo.

Validation workshops tested design iterations of the platform with an emphasis on suitability for the skills of the intended user base.

Events workshops promoted the MOPA prototype across Maputo to attract local software developers to take an interest in enhancing the software design and features.

RECOMMENDATION: Beware of challenges when designing with low-skilled and low literate users

The process of understanding the users and their ecosystem, as well as ongoing user evaluations, involves research and much face-to-face contact with the target users. Interviews, observations and user testing are regular activities. In general, participants in user studies can be uncomfortable because they feel they are being tested instead of the digital solution.

For low-skilled and low-literate users, in particular, such activities can be intimidating. The result is that honest and regular feedback, critical for designing appropriate solutions, can be limited. Digital solution developers and development agencies usually do not come from the communities they are working with, which further complicates the experience. Below is a summary of common challenges that have been encountered over years of research, with some suggested techniques for addressing them.²¹

- Often researchers are perceived as having a raised social status by the people they investigate, and are seen as the creators of digital tools, including mobile phones, even when they are not. As a result, low-literate people are particularly prone to **participant response bias**. That is, when asked a question they respond with what they think the interviewer wants to hear, instead of providing their honest opinion.
- Researchers often do not speak the same language as the users they are working with and employ local translators and facilitators to assist. If not trained properly, however, much of the user responses may be **lost in translation**. Further, response bias towards the digital tool increases five times when the researcher is a foreigner using a translator.²²
- In order to really get to know the target users and build trust with them, it is desirable to be deeply immersed in their community. Of course this is not easy, given the **social distance** between the researchers and the participants, and due to **time and budget constraints** that may not allow such investment.
- Low-literate and low-income people often live in densely populated areas, especially in cities, making it **difficult to conduct distraction-free observations**. Even within the home, the presence of certain family members may influence participants' responses.

In order to overcome some of these challenges, researchers can:

- **Work through well-trusted intermediaries**, such as local non-profit organisations embedded in the local community and who speak the language.
- **Provide sufficient training** and briefing to local facilitators.
- **Conduct field studies in familiar but neutral and distraction-free spaces**, where participants can feel freer to provide honest responses.

Focus on users' digital skills and competences

According to the Principles for Digital Development, understanding users' access and comfort levels with technology is critical to designing appropriate solutions for them. UNESCO does not believe efforts in this regard have been thorough enough to date. In the context of an increasing need for digital skills and competences, and in recognition of the lack of these as a major barrier to digital inclusion, the approach to developing and measuring skills needs to be more rigorous.

While definitions vary, UNESCO and the ITU²³ propose that digital skills and competences are best seen as existing on a spectrum, including:

- **Basic functional digital skills**, which allow users to access and conduct basic operations on digital technologies.
- **Generic digital skills**, which include using digital technologies in meaningful and beneficial ways, such as content creation and online collaboration.
- **Higher-level skills**, which mean using digital technology in empowering and transformative ways, for example

²¹ Thies, I. 2015. *User Interface Design for Low-literate and Novice Users: Past, Present and Future*.

²² Dell et al. 2012. "Yours is Better!"

²³ Broadband Commission for Sustainable Development. 2017. *Working Group on Education: Digital skills for life and work*.

for software development.

Beyond skills, digital competences include awareness and attitudes concerning technology use.

Most low-literate users fall into the first and second categories and thus need the most support.

RECOMMENDATION: Support the development of digital skills and competences of users

Digital solutions must be designed around user's capabilities, primarily their literacy, numeracy and digital skill levels. Since through digital usage skills are developed, it is desirable to design learning opportunities into the solution – its UI and content – so as to maximise the learning impact. In this sense, it is ideal to think not about users, but learners.

Recommended actions include to:

- Where relevant, **design flexible learning pathways for users**. Different learning paths offer an entry level into usage but then gradually lead to more complex levels in the content and interactions. Provide feedback to show users their progression and increasing technical mastery.
- Where possible, **create pedagogically sound content**. Terms and language should educate users, in a scaffolded way, moving from simpler concepts to more complex details. In this way the content progressively builds upon itself. Explicit or implicit assessments can be designed into the solution to gauge user comprehension.
- **Set goals for digital skills and literacy development**. Many development initiatives set impact objectives, for example, more sustainable farming practices in an area or that an education drive to support refugee children will result in an increase in their school enrolment. In addition to setting sector specific and livelihood impact objectives, the same can be done for digital skills and literacy objectives. Setting such goals, which could align to key points along the learning pathway or assessment scores, will focus efforts to develop user's competences.
- **Personalise the user experience**. In this way the tracking and feedback process is enabled, providing a tailored view of the digital solution to the user.
- Offer **content in the local language** of the users. The dominance of a few major languages and dearth of those spoken on-the-ground by millions of people remains a major reason for digital exclusion. Using a digital service becomes that much more attractive and feasible when it is in a user's own language, providing a foothold into digital usage and skills development.

RECOMMENDATION: Benchmark and track the digital skills and competences of users

UNESCO recommends benchmarking the digital skills and competences of target users. This not only enables apps and services to adequately meet user capabilities, but sets a baseline from which skills improvement can be measured. With continued usage of technologies, digital skills improve, which can motivate users to more digital usage. In an iterative development approach, changing user capabilities has implications for the ongoing re-design and features included in a digital solution.

A broad framework covers the skills needed by users of digital solutions, whereby all users can be located somewhere on these spectrums:

- Foundational skills (Illiterate ↔ Highly literate)
- Subject knowledge (Low ↔ High)
- Digital skills and competences (Low ↔ High)
- 21st century skills (Low ↔ High)

There are a few ways to gauge users' skill levels:

- **Use an established national or regional framework for mapping the digital skills and competences** of the target user group, ideally in the local language and relevant to the local context. For example, in the UNESCO Landscape Review the *DigComp2.1: The Digital Competence Framework for Citizens*²⁴ was used. Developed by the European Commission, it provides a common reference on how to describe key areas of digital competence and proficiency levels among individuals. UNESCO is in the process of developing a *Digital Literacy Global Framework*²⁵, which will be useful for global comparison of digital skills. Another example is the *Basic Digital Skills Framework*²⁶ developed in the UK.
- **Collect and analyse relevant usage data** to track skills development. For example, if a user gradually uses more sophisticated features over time, or accesses text after initially only choosing audio content, this can indicate an increase in digital skills and/or literacy. Tracking skills development in this way need not be an expensive or onerous task, as long as it is designed in from the start.
- **Conduct pre- and post-usage tests** to track skills, as with the Medic Mobile case study.

Case study: Benchmarking informs training and team support

In its research, UNESCO has not found many instances of skills and competences benchmarking. One project that does so is **Medic Mobile**, an integrated mobile system for improving maternal and neonatal health. In rural Nepal, the community health workers (CHWs) that use the system on the ground have needed initial and ongoing training.

Medic Mobile routinely runs pre- and post-training skills tests. Post-test results from a training conducted with 500 CHWs revealed the strongest overall gains in the more complex mobile phone operations that CHWs initially struggled with most. There were 40–45 per cent gains in the ability to use SMS functions including retrieving specific SMSs and accessing the phone's inbox.

By benchmarking the users pre- and post-training, Medic Mobile is able to track development. It also informs their practise of pairing low-literate with higher-literate CHWs, to provide peer support to each other.

Ensure content is understandable and relevant for low-skilled and low-literate users

The information needs of the target users should have been identified during the user studies. The challenge is to best meet those needs with content that is understandable, relevant and delivered in a usable form. In this way one of the major barriers to digital inclusion will be addressed: low incentives to go online because of a lack of available and attractive local content.

Content development must be based on a well-defined strategy and, most importantly, include rigorous testing. In general, content works best when it is kept simple and is deemed trustable by the target audience. Having content created by the end users themselves helps in this regard. Content should also be designed for group or mediated digital usage.

RECOMMENDATION: Develop a content strategy to meet users' needs

A content development strategy should encompass a broad and iterative process. Based on a deep understanding of users' information needs and their local context, the process may involve storyboarding, pre-testing of pilot content, refining of content, delivery, ongoing monitoring and updating. Content should not be created once and published without tracking its distribution and consumption, or without mechanisms in place to continually revise and improve it.

²⁴ See ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/digcomp-21-digital-competence-framework-citizens-eight-proficiency-levels-and-examples-use

²⁵ See gemreportunesco.wordpress.com/2018/03/19/a-global-framework-to-measure-digital-literacy

²⁶ See www.thetechpartnership.com/basic-digital-skills/basic-digital-skills-framework/basic-digital-skills-framework-2015/

Important elements of the content development cycle for low-skilled and low-literate users, which should be built into the strategy, include to:

- **Segment different audiences**, where needed, as each group may have different information needs and preferences. For example, health content can be simultaneously targeted to mothers and fathers, with each message presented in an appropriately tailored fashion.
- **Clearly define the content purpose**, such as whether the aim is to simply inform or change behaviour. The purpose will inform the content itself and its delivery. For example, to change the behaviour of rural mothers so that they vaccinate their children, a call to action is important in messages sent to them.
- **Establish the stakeholders involved in content development**, which include the actual content creators; those who may need to validate the content, such as health officials or agriculture extension workers; and a representative group of end users to test it. In order for the content to be pedagogically sound, ideally an educationalist should be involved in the content creation process.
- **Test** for the optimal way in which the content is **delivered**, in what **format**, through which **channels and media** (audio and/or text, for example), and in which **style**. Even the **volume of content** available should be gauged, as low-skilled and low-literate users can easily be overwhelmed by too much information. **Frequency** of delivery is also important to establish, as certain times of the day or week may yield better reception by the users.
- **Co-develop content** with the end users to ensure that it is understandable and context-appropriate, as well **pre-test** early content versions.
- **Consider how to monitor content** distribution and its consumption. Ways of tracking content, or soliciting user feedback, should be built in from the start. Most importantly, necessary revisions to content should be implemented following the same rigorous process.

Case study: Message volume, placement and format influence uptake

The **Talking Book**, a ruggedized audio player and recorder by Literacy Bridge, offers agricultural and livelihoods information to deep rural communities in four African countries.

Through focus groups with the target audience, it was established that they preferred less content at a time, but that content should be regularly updated.

By collecting data on which content is played the most, Literacy Bridge found that earlier messages in a content category are played more frequently than later messages. Creative content such as songs and dramas also receive more attention than lectures.

As a result of these findings, only five or six messages per content category are loaded onto the device at one time, with the content being updated every three months. In this way information overload is avoided. Further, the most important messages for a given category are given the top three message spots.

Case study: Constant testing reveals the most appropriate content style

The **3-2-1 Service** by Human Network International (HNI) and Viamo is a local-language service that provides on-demand access to livelihoods information in 14 countries, via audio and text.

As a part of the message style testing, focus group sessions are held to assess preferred elements for a particular country. For example, two messages may be tested to determine whether a monologue or dialogue format resonates more with the target audience:

Monologue: Reading books aloud to children builds vocabulary and comprehension skills, as well as promotes positive associations with reading.

or

Dialogue (two different people speaking):

A: Reading books aloud to children is important.

B: Why is it important to read to children?

A: Because it builds vocabulary and comprehension skills.

B: Really?

A: Yes, and it also promotes positive associations with reading.

RECOMMENDATION: Create content that is simple, clear and trustable

Creating content that is simple enough to understand, but rich enough to inform, change behaviour and educate, is challenging. Further, it needs to be trustable and relatable to the audience. While each audience group is different, a number of general guidelines are helpful:

- Because low-skilled and low-literate users are **easily confused** when using technology, it is critical to **use plain language, ideally in the local language**. This seems obvious and yet is often not done, simply because the experts who create the content forget that their technical terminology, which they use every day, is not widely understood. For example, words like ‘immunization’ or ‘pesticides’ are likely to be unknown to low-skilled and low-literate users.
- Equally, since **images** are often used instead of, or as complements to, text, they should be **simple, clear and culturally relevant**. The MIRA Channel mobile health application has different images and contexts for use with its Indian, Afghani and Ugandan users, each reflecting local people and styles. Audio content containing voice should be in **slow, clear and loud-enough speech**.
- Always **ensure that content is gender sensitive**. Given that women and girls are usually less literate and less exposed to technology, content should be inclusive of female users in language, imagery and actors. Content should always encourage female usage. At the same time, ensuring content is targeted to men is equally important as many livelihoods activities affect everyone in a community or family.
- Low-skilled and low-literate are often afraid of technology. Build **help or instructions into the content**, about how to use the content and the solution, to reduce confusion and fear.
- Because low-skilled and low-literate users are distrustful of technology, establishing a sense of **trust** is important. Using **local language content, and even local actors and voices** can be very helpful. Another way to build trust, and increase relevance, is by making content **relatable** to the audience and their lives. For example, to provide locally relevant agriculture and livelihoods information to rural farming communities, the non-profit organisation Digital Green trains community members to produce short videos that feature local farmers as the experts. Using local actors reduces the perceived distance between the farmers and outside experts and makes the content relatable.
- Because low-skilled and low-literate users struggle to transfer learnings from digital to real life, **content should mirror the actual application environment** as closely as possible. For example, if most users in the target audience have feature phones, then that is what should be used in instructional videos.
- A key way to ensure trustable and authentic content, is to support **content creation by end users**. Low-skilled and low-literate users do not only consume content, but can produce it. The Talking Book project, as well as Mobile Vaani in India, support content creation by their target audience. Mobile Vaani seeks to improve health, environmental, agricultural and governmental services through a phone call-based community-media platform, used by more than two million people from offline, rural areas. The platform relies heavily on users contributing their news, grievances, feedback and questions, as forms of civic engagement, self-expression and even cultural affirmation.

Content can be delivered in many styles, each potentially increasing the clarity, credibility and influence. Stylistic elements to consider include the **gender** of the narrator, **point of view** (first-, second- or third-person perspective), whether the message is **positive or negative** (do this vs don’t do that), and, if appropriate, what the **call to action** is. A call to action could be accompanied by asking the user to **set goals** and helping him or her **track progress** towards meeting the goals, and sending reminders. The **format and tone** of the message – whether it is a monologue or dialogue, a serious drama or light edutainment – also need to be considered.

A key principle is **never to make assumptions** about content and its delivery style. Different audiences have different preferences and so continuous testing is necessary. While much testing happens in focus groups or interviews, the ideal scenario is **real-world testing**, which will reveal the actual interest and responsiveness of the end users.

RECOMMENDATION: Design content for group or mediated digital usage

In general, digital solutions are designed for individual usage scenarios. However, amongst low-skilled and low-literate users technology is often shared and used in group or mediated scenarios. The latter point due to such users being easily intimidated when using technology alone. Shared usage is not necessarily a bad thing as it can lead to peer-to-peer learning, with users encouraging and supporting each other as they collectively navigate the content and digital

solution. There are a number of ways to leverage shared usage for impact:

- Content should encourage group discussions by including **questions**. As an example, agricultural content can spark discussion amongst men and women as different answers and practices are shared. Asking assessment style questions can also be a good way to foster group discussion as people share responses and talk about which one is correct. Ending content by proposing activities for the group can also stimulate learning interactions.
- In mediated usage scenarios, typically one user has stronger technical skills, or perhaps subject knowledge, than the other. Drawing on parent-child co-use of technology, but proposing a principle that can be applied more broadly, it is suggested that content should not be aimed only at the “lowest common denominator” of skill level. Considering “**multiple planes of engagement**” means that stronger users also remain engaged. This can include more complex features or content. Questions for discussion are equally useful in such cases.²⁷
- When consumed in a group, content that is **aimed at multiple actors** can be effective in increasing engagement. For example, the Talking Book project found that gender relations content became interesting for husbands as well as wives in Ugandan villages.

Utilize appropriate media and tailor user interfaces for low-skilled and low-literate users

Digital solution design can best serve low-literate and low-skilled users by utilising appropriate media mixes, input methods and UI approaches. These design decisions are driven by user capabilities and the technology context of the users including, for example, what devices they mostly have access to, what the local infrastructure supports and what they can afford.

RECOMMENDATION: Consider mixing media and input methods for low-skilled and low-literate users

UIs and content of digital solutions are generally presented as four media types: text, images, audio or video, or in a combination of these elements. For example, SMS or USSD for can be used for text media and interactive voice response (IVR) for an audio interface.

Input methods are generally based on typing, touch or voice, or, again, in a combination of these. Typing on an alphanumeric keypad to navigate a USSD or IVR menu, or open an SMS, is very common amongst digital solutions for low-skilled users. At the same time, in the UNESCO Landscape Review apps are the most common delivery channel, showing that touch is increasingly being used to support low-literate and low-skilled users.

The following approaches are recommended when designing solutions:

- **Ensure that the choice of media and delivery channel is appropriate for all the end users.** The 3-2-1 Service in Zambia was initially offered only via SMS, a decision based on the official literacy statistics of the country. However, the team soon realised that many of the women they were trying to reach couldn't read.
- **Consider a delivery channel mix** to broaden access and engagement. The 3-2-1 Service now delivers content across a variety of channels. IVR is the most prominent and useful among callers with no or low literacy. SMS is available as a means of sending topic-related content snippets for those that can read.
- **Mix media**, for example, accompany images and text with video or audio, to increase the possibilities for user engagement. Print media can be an effective complement to digital media and should not be overlooked. Further, offering content in more than one language, in addition to the local language, is also desirable. Approaches such as these are useful for reinforcing communication and interaction, for example, menu options that are presented as images and read aloud by the device provide navigation scaffolding for low-literate user interaction.
- **Ensure the input method is appropriate** to the audience. Most smartphone and tablet apps allow touch and typing, offering a richer input mix. Voice input, while traditionally difficult to implement, is increasingly accessible for developers. The potential to **leverage advances in voice computing**, found in commercial

²⁷ Takeuchi, L., and Stevens, R. 2011. *The new coviewing: Designing for learning through joint media engagement*.

services such as Amazon’s Alexa, is also increasing for the wider developer community.

- **Experiment with innovative form factors**, such as wearable technology or ruggedized audio players, to potentially increase interaction opportunities for users. While Khushi Baby’s wearable necklace only stores data, the possibility for using a wearable to interact with users and smartphones is already widespread in commercial use cases, such as fitness tracking bracelets.

The UNESCO Landscape Review presents a working typology for digital solutions, including the range of functions, delivery channels, access devices, UI options, content types, support options and affordances for low-skilled and low-literate users, which can provide a useful reference point for developing and categorising digital solutions.

RECOMMENDATION: Design for maximum usability for low-skilled and low-literate users

In general, following UI best practices is good for all users, not only those who are low-skilled and low-literate. Since around 2012 there has been a trend towards simpler and flatter interfaces as can be seen in the products of companies like Apple, Google and Microsoft.²⁸ Building on this trend, a number of design approaches can support low-skilled and low-literate users’ digital interactions:

- **Ensure consistency when applying design elements.** Low-skilled and low-literate users are easily confused when using technology and design elements missing on some screens, such as navigation buttons or text, can reduce users’ confidence in their ability to use a system.
- **Apply visual scaffolds** such as large icons and colour coding as a memory aid to show relationships between categories. Visual signposts in the digital solution can guide users to next steps, or back to where they came from. Keeping visual clutter to a minimum by not showing too many elements on one page or screen is preferable.
- Designing for easily intimidated audiences means the UI must **provide constant feedback** to reassure the user of his or her actions. Further, where content is played, for example as audio or video, the **speed must be adjustable by the user**. Allowing the user to pause and repeat content makes it easier for him or her to consume content in a way that supports reflection or discussion.
- **Where possible, minimise menu hierarchies and offer linear navigation.** Low-skilled and low-literate users do not always realise that scroll bars lead to more content hidden off-screen. Minimising the set of menu options and presenting them in a flat structure, where possible, is helpful.

Ensure initial and ongoing training and support

For low-skilled and low-literate users even the simplest technology interactions can be challenging. There is a real need to provide training and support to these users as they encounter digital solutions for the first time – the onboarding process – and then continue ongoing usage. For example, even for the 3-2-1 Service, whose IVR system requires the user to only listen to a range of options and press a number to make a selection, user training and support was necessary. Training and support can be provided in the digital solution itself, as well as in real life. Further, raising awareness in the community and leveraging the “human network” is essential to increasing uptake of the digital solution.

RECOMMENDATION: Embed support into the digital solution design

A level of always-on support can be built into the app or digital service in ways that do not require human intervention:

- Provide **information-presentation support** in the form of help pages, FAQs, tool tips and tutorials. Increasingly, apps that have new sections or first-time users offer on-screen animations and pointers to explain how to use the various features. The 3-2-1 Service is trialling a game to teach users how to use IVR, before they use core service.
- Provide **machine-automated support**, such as auto-correct of text, auto-suggest or auto-complete of words

²⁸ Anderton, S. n.d. *UI design – A history of web design trends*.

being entered – features already found in smartphones. Such features often utilise artificial intelligence (AI), which increase their ability to provide support the more they are used.

- Potentially utilise the recent addition of **chatbots** into instant messaging services such as Facebook Messenger and Telegram, which have seen machine-automated support provided in a more interactive way. Users with some reading and digital skills may benefit from the conversation-style support provided.

RECOMMENDATION: Provide training and support around the digital solution

Training and support done in-person provides a human face to technology interaction. In the UNESCO-Pearson case studies, CHWs, volunteers and project team members provide face-to-face support to end-users.

To maximise the human element, including for raising awareness and increasing uptake, the following approaches are recommended:

- **Provide helplines** that users can call for support. Chipatala cha pa Foni (CCPF) links rural communities in Malawi with health systems by allowing villagers to call a medical advice service. Seventy-five per cent of calls are resolved without having to refer the caller to a health facility, saving the caller the time and cost associated with travel to a clinic, and alleviating the burden on already low-resourced health facilities.
- **Leverage existing human networks** for tech support and raising awareness. Many of the UNESCO-Pearson case studies work through existing agent networks or draw on close networks that include family and household members. For example, when the Rainforest Alliance piloted its Farmer Training App to encourage sustainable farming practices in Guatemala, the children of the farmers stepped up as tech supporters, teaching their parents how to navigate the app. Encouraging trusted and champion users to recommend a digital solution to their peers can be a powerful way to increase uptake.
- **Build local support capacity.** Infomediaries already known and active in the community can be trained to provide tech support as well as on-the-spot training.

Case study: Build local support capacity amongst existing human resources

Nano Ganesh is a mobile phone-based remote control and monitoring system for agriculture water pumps in India. Often rural farmers experience delays in support services because of the limited resources available. Ossian Agro, the company behind Nano Ganesh, has thus developed a community-based model to train local technicians in installations, repairs and technical support skills to reduce the bottleneck in system delivery. Further, Ossian Agro has created support tools such as orientation multimedia, operating manuals and live video support in local languages for farmers and technicians.

Case study: Mobilize the community for participation

For **Mobile Vaani**, community participation is essential to the success of the media platform. In order to increase community uptake of their digital solution, the organisation developed a participation model consisting of a network of local clubs, led by over 300 community reporters and other volunteers interested in the Mobile Vaani initiative. These groups are trained in participatory content generation and are responsible for widening the user base in their regions. The clubs oversee the quality assurance of their content providers to ensure a vibrant and engaging user experience.

Constantly monitor, measure and improve

With digital solutions it is possible to constantly monitor user activity, content consumption and creation. Usage data collection and analysis is critical for driving effective management. It can indicate whether project and user goals are being met or, if not, can point to where changes may be needed. In an iterative development approach, usage data and analysis informs constant system improvements.

RECOMMENDATION: Ensure appropriate data is being collected and tracked in safe and accountable ways

Where possible, it is ideal to build a profile of a target user and his or her usage patterns so as best to understand whether or not the digital solution is meeting their needs, as well as help serve meeting of project goals. Establishing measures to collect and analyse data responsibly is critical to protect users and the organisation itself.

- **Determine appropriate data elements to collect.** Not all possible data should be collected as this can overwhelm the system, often burden the users with additional tasks and, crucially, increase the risk of privacy infringement of users. The appropriate data elements should be determined by the goals and success metrics for the digital solution and the project as a whole, balanced against the convenience and privacy of the user.
- **Ensure multiple monitoring “views” in the digital solution.** As an example, the GSMA recommends,²⁹ having i) a user view, to understand how users engage with the digital solution overall; ii) a content view, to determine data such as which content is accessed more or less, or which is abandoned halfway through viewing; and iii) a service view, which can show how different users journey through the entire digital solution or drop off at certain pain points. Drawing on such views, the GSMA found that male and female users of the 3-2-1 Service in Madagascar had very different user journeys, with varying content preferences and drop-off points.
- **Ensure privacy, security and responsible management of data.** It is critical that best practices³⁰ be followed to protect the data collected about users, to only collect what is needed and to be completely transparent about what the data will be used for. Low-skilled and low-literate users, especially, may find it challenging to understand the process and implications of giving consent for their data to be used. Time must be taken to explain the rationale and consequence to the users.
- **Practise algorithmic accountability.** Any organisation conducting data analysis must ensure that the data as well as the analysis of it is open to public scrutiny. Further, the onus is on the organisation to explain to the end users – in easily understandable ways – the source of the data, the logic of the data analysis as well as the findings.
- **Complement automatically collected data with human feedback.** Automatically collected data may not pick up on all the needs, concerns or views of the end-users. Face-to-face research – such as through focus groups and interviews – is very important to maintain the human element in the monitoring process and contribute to a more complete picture of usage. Data – such as gender and education level – can be captured in person when registering users. Many of the UNESCO-Pearson case studies involve intermediaries meeting regularly with end users, providing further opportunities for data collection.

RECOMMENDATION: Include the full range of stakeholders in data analysis

Data is not only relevant for the developers of the digital solution while they manage and improve it. To the actual users, from refugees to government officials, analysed data can be presented for improving livelihoods activities. The following activities are recommended:

²⁹ GSMA. 2017. *GSMA mHealth Gender Toolkit: Key principles and tips for reaching women*.

³⁰ United Nations. 2014. *A World That Counts: Mobilising the Data Revolution for Sustainable Development*.

- **Map and serve the data needs of the full range of user stakeholders.** Different user groups have varying data provision roles and information needs. Khushi Baby provides a good example of how, as data is collected along the user chain, it is aggregated and analysed for district-level decision-making related to health administration. The mothers and CHWs are active participants in data generation for programmatic and policy interventions – in real time. In turn, they benefit from the data analysis that informs the treatment they receive or administer. Each of the three user groups: mothers, CHWs and district officials, interface with appropriately designed technology: wearable necklaces, mobile data collection apps and web-based dashboards, respectively.
- **Leverage big data generation by end users for sector support.** Even though end users are low skilled and low literate, and interfacing with often very simple solutions, doesn't exclude the opportunity for data collection and complex analysis by solution providers, as with Crop Specific Mobile Apps.
- **Ensure quality control when low-skilled users are data generators.** Steps need to be taken to ensure that when low-skilled and low-literate users generate data, or use a system for the benefit of others, there is sufficient quality control to protect the users and their beneficiaries. Such control can happen offline, for example, through intermediaries, or be automated, as with hearScreen™.

Case study: Analyse big data to support sector interventions

By tracking farmer usage of each of the **Crop Specific Mobile Apps** in rural India, the company behind it can identify in which districts farmers need to diversify their crops, where they are diversifying but need guidance, and where new disease outbreaks are likely happening.

Such usage data can be sent to the cloud server via SMS, if needed, to ensure collection in low-connectivity districts. The farmers thus become rich data sources for interventions triggered at a district- or state-level by government. By collecting, analysing and passing on the data, a potential revenue stream is created for the solution provider.

Case study: Automate quality control of usage and data generation

In most developing countries there is a dearth of trained professionals to ensure that children and adults receive auditory tests to monitor for hearing problems. **hearScreen™** is an app that allows anyone with very limited training and a headphone set to conduct hearing tests. By sending false positives to the person administering the test (the screener), and tracking whether he or she records these as legitimate responses from the patient, an individual screener quality index is created. The index acts as a measure for quality control and system reports inform supervisors about screeners that need further training.

CONCLUSION

The guidelines offer a set of recommendations for greater digital inclusion of people with low skills and low literacy. It is hoped that with implementation, more people will be able to access online opportunities. As they use more apps and services, their skills improve, confidence increases and livelihoods benefit.

As with all guidelines, it is UNESCO's intention that this remains a living document that is updated over time. Through implementation, the guidelines and recommendations are shaped and sharpened. Ideally the organisations that use the guidelines will share their feedback of what has worked, what lessons were learned and any suggestions for additional elements to include.

To share experiences, please use the [feedback template](#) or contact ictliteracy@unesco.org. All feedback will be considered for inclusion on the UNESCO-Pearson Initiative website: en.unesco.org/themes/literacy-all/pearson-initiative.

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