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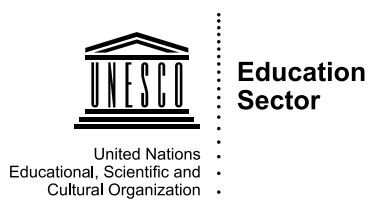
Guidelines

Designing Inclusive Digital Solutions and Developing Digital Skills

Education
2030 The SDG 4 icon, which is a colorful wheel with four segments.

UNESCO Education Sector

Education is UNESCO's top priority because it is a basic human right and the foundation on which to build peace and drive sustainable development. UNESCO is the United Nations' specialized agency for education and the Education Sector provides global and regional leadership in education, strengthens national education systems and responds to contemporary global challenges through education with a special focus on gender equality and Africa.



The Global Education 2030 Agenda

UNESCO, as the United Nations' specialized agency for education, is entrusted to lead and coordinate the Education 2030 Agenda, which is part of a global movement to eradicate poverty through 17 Sustainable Development Goals by 2030. Education, essential to achieve all of these goals, has its own dedicated Goal 4, which aims to ***"ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."*** The Education 2030 Framework for Action provides guidance for the implementation of this ambitious goal and commitments.



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Introduction

In an increasingly online world, people need digital skills and literacy to work, live, learn and communicate productively. Without these skills, people face marginalisation not only in the physical world but in digital realms as well.

Fortunately, digital exclusion is increasingly avoidable.

Purposefully designed solutions can help people—even those with very low literacy levels and nascent technology skills—navigate digital spaces and benefit from relevant applications, such as those that connect users to health services, support refugees or help farmers improve productivity. This publication puts forward guidelines to help today's technology pioneers build more inclusive digital solutions. They show private sector companies, NGOs, international organizations and governments what factors to consider, questions to ask and processes to follow when developing solutions for people with limited literacy skills and low digital skills (referred to as 'low-skilled users' in the context of this publication).

The recommendations are general and do not attempt to speak to the full range of possible and existing digital solutions. Rather they provide orientation and guidance to developers, donors and other stakeholders who are working to help people unfamiliar with technology find and use digital tools for empowerment and enrichment.

Establishing digital entry points for people with limited literacy and limited digital skills creates a virtuous cycle that accelerates learning and development, benefiting individuals and strengthening communities and livelihoods.

This publication draws on two years of background research and is informed by and complements similar toolkits and recommendations, including the Principles for Digital Development as well as resources from the GSMA and IDEO.

Key definitions

Literacy

The ability to identify, understand, interpret, create, communicate and compute using printed and written materials associated with diverse contexts. Literacy involves a continuum of learning in enabling individuals to achieve their goals, develop their knowledge and potential, and participate fully in community and society.

Digital skills and competences

While definitions vary, UNESCO and the International Telecommunication Union (ITU) propose that digital skills and competences are best seen as multidimensional and 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 for software development.
(Broadland Commission for Sustainable Development, 2017)

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.

How the guidelines were developed

The guidelines are an output of a collaboration between UNESCO, Pearson and Project Literacy to investigate, document, and share strategies to make digital solutions more inclusive for people with limited literacy and limited digital skills. They were developed through a systematic process, starting with the drafting of the UNESCO landscape review Digital Inclusion for Low-Skilled and Low-Literate People (UNESCO, 2018).³ After a global call for proposals, fourteen projects from around the world were selected to be featured as case studies for their innovative approaches to digital inclusion. Collectively the case studies offer practical tips, insights and recommendations for greater inclusion. Both the case studies and the landscape review underpin the guidelines presented in this publication.

To ensure the guidelines represent a wide range of perspectives, a consultation process was followed to receive input from an international expert group and the general public. UNESCO also elicited feedback on a draft version of the guidelines at the 2018 UNESCO Mobile Learning Week conference. The UNESCO-Pearson partnership will share and promote the guidelines to inform the work of digital solution providers, implementation and donor agencies, development partners. The partnership will further work to help governments establish policy conditions that encourage the inclusive use of technology.

³ See en.unesco.org/themes/literacy-all/pearson-initiative

Target audience

The primary target audiences for the guidelines are digital solution providers – from tech giants to startups and NGOs – and implementation and development partners, such as the UN Food and Agriculture Organization (FAO), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ, the German development agency), the UN High Commissioner for Refugees (UNHCR), the UN Children's Fund (UNICEF) and the US Agency for International Development (USAID), which can shape the terms of reference for digital solution

development. Government agencies that support the design and development of digital solutions are also targeted, as well as technology incubators and accelerators.

The secondary audience includes policy-makers – who could use the guidelines to create inclusive policies and regulatory frameworks – and mobile network operators and technology providers – to create 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 (UNESCO, 2018) and the accompanying set of fourteen case studies. A toolkit with additional resources that complement the guidelines is also being developed.

Rationale for the guidelines

Barriers to digital inclusion

Almost half the world's population is online, which is a major achievement. However, there is still much work to be done. Those already online often do not fully utilize the potential of the internet. Those still offline, the 4 billion potential users, look different from those already benefitting from digital opportunities. Globally, the offline population is disproportionately rural, poor, elderly and female. Offline people often have limited education, low literacy (Sprague et al., 2014) and typically hold informal-sector jobs. To increase digital inclusion, fundamentally different strategies are needed.

There are four major barriers to digital inclusion (Schmida et al., 2017) which require a holistic response: lack of infrastructure, low incomes and affordability, limited user capabilities, and lack of incentives to go online.

While it is critical to address the first two barriers, they largely fall outside of the scope of these guidelines. Limited user capabilities are seen in the 750 million people who cannot read or write (Montoya, 2017) and the many more who are semi-literate. Beyond literacy abilities, most adults in low- and middle-income countries do not have

even basic digital skills and competences (UNESCO, 2017). Across Africa, seven in ten people who do not use the internet say they just don't know how to use it (World Bank, 2016). Even in Europe, 19 per cent of adults lack the literacy skills, and 45 per cent lack the basic digital skills, needed to function fully in a modern society (OECD, 2016).

Lack of incentives is another factor. This includes 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 each person does not exhibit all of the offline attributes. However, it is useful to recognize key characteristics of this group.

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

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.

Supporting literacy development

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 young people and a substantial proportion of adults, both men and women, achieve literacy and numeracy by 2030 (target 4.6).

A 'literate environment' refers to the contexts, conditions and opportunities that are particularly stimulating and supportive of the acquisition and use of literacy skills (UNESCO-UIL, 2017). It is important to regard digital solutions as enriching the literate environment in the sense that they offer opportunities for learning and practising 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.

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 (GSMA, 2017b; De Reynal and Richter, 2016). 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 (Easton, 2014).

While digital solutions aimed at low-literate populations are not always focused on enhancing literacy as such, they play a part in creating demand to gain 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 literacy practices. 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.

Increasing usage and uptake

Users with mobile digital skills are higher-level data users and have the confidence to move beyond a limited set of application 'islands' to more widespread use of mobile apps and services (GSMA, 2017b). As users become more digitally skilled they also teach others how to use the technology, creating a multiplier effect that drives further uptake (Donner et al., 2011). Thus, obtaining more skills presents the opportunity for increased engagement, higher numbers of users and, if services are paid for or data drives revenue, greater earnings.

Supporting development and inclusion

Digital technologies have been shown to support broad development outcomes, such as contributing to improved health care, education, livelihoods and civic engagement. While the digital divide is real for millions of people, digital technologies also offer the potential for inclusion. When digital solutions are

developed for women and rural users, these groups which are traditionally underserved can be included in skills and livelihood development.

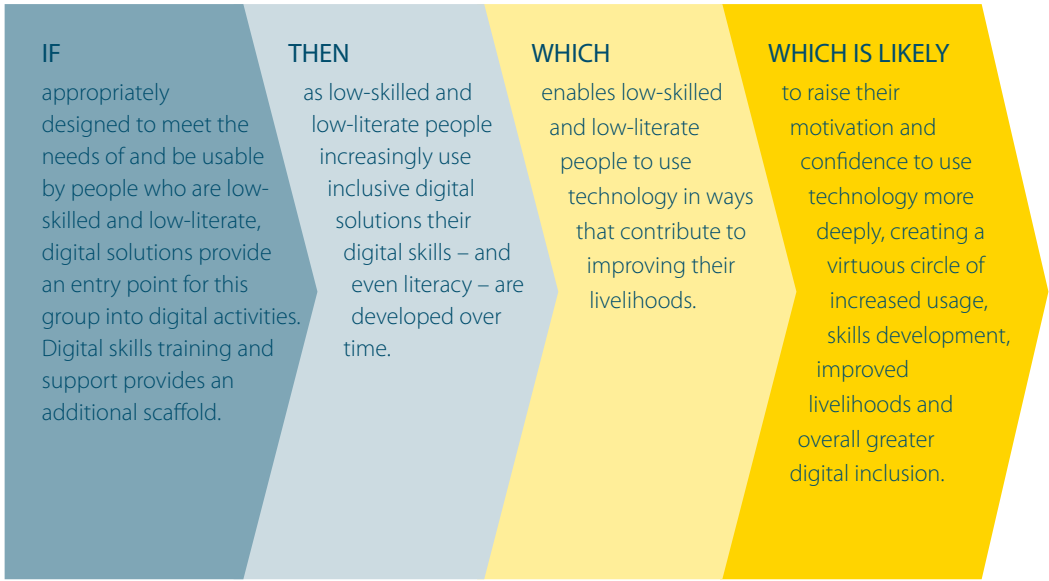
Furthermore, digital skills are increasingly required in workplaces around the world. In developing countries, on average one-third of urban workers use digital technologies at work (World Bank, 2016), making investments in digital skills key to also advance the goal of decent work for all (SDG 8). In

this context, the United Nations launched in 2016 the Global Initiative on Decent Jobs for Youth to scale up action and impact on youth employment, including by mobilizing a global commitment to the promotion of digital skills for youth.⁴

⁴ See www.decentjobsforyouth.org/wordpress/wp-content/uploads/2017/11/Thematic-Plan-1-Digital-Skills.pdf

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:



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, research (Thies, 2015) has revealed general characteristics of how some low-skilled and low-literate people use technology. These traits, occurring along six dimensions, are common enough to mention, and some of them may apply to the particular audience being targeted.

Cognitive

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. Second, they might find conceptualizing and navigating information hierarchies – such as app menus – more challenging than they are for well-educated users.

Trust

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), which is usually designed for literate users.

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.

Social

Low-literate users don't use technology alone.

Low-income people often live in close-knit communities. Within families and communities, devices are often shared, which impacts on user privacy. 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.

At the same time, 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, for instance to read messages, navigate the UI or troubleshoot the tech. These infomediaries are often younger family members, close community members or even people at institutions such as libraries or community centres.

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

Gender

Low-literate users are divided by gender. Two-thirds of the world's illiterate population are women (UNESCO-UIS, 2017). Women generally use fewer mobile services than men (GSMA, 2017a). In South Asia women are 38 per cent 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 their lack as a factor limiting their use of the internet (Worldwide Web Foundation, 2016). In short, for low-literate and low-income users, gender matters.

Motivation

Low-literate users are driven by motivation and aspiration. 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 young people in India hungry for entertainment content traversed as many as nineteen steps to transfer music, videos and comedy clips between phones and PCs via Bluetooth. In terms of livelihoods and living, the desire to sell crops for more, the aspiration to raise healthier and more educated children, the need to access government grants or apply for a visa, are the kinds of motivators and aspirations that need to be tapped to engage low-literate users.

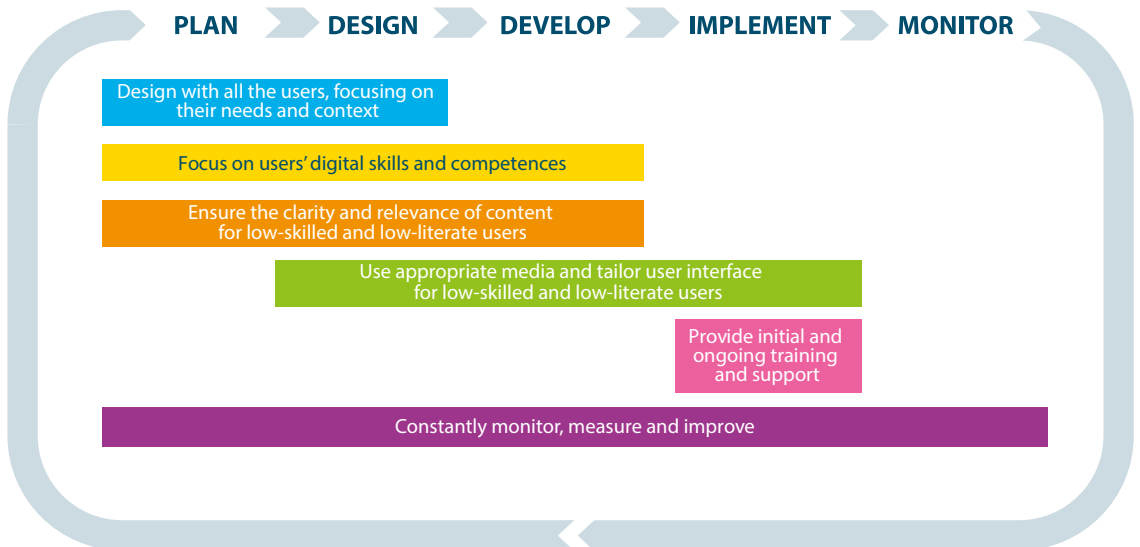
Resources

Low-skilled and low-literate users are often resource-constrained. People with low digital skills and low literacy are more likely to experience limited or unreliable internet connectivity, be sensitive to or constrained by data costs, and use lower-end devices.

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 who need the most support. The guidelines should be applied throughout the phases of the standard product development life cycle.



01

Design

with all the users,
focusing on their needs
and context

For designers and developers of solutions for users with low levels of digital 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 the particular challenges. If digital solutions are not driven by real needs and motivations, and are not appropriate to users' contexts, they will not be relevant, usable and beneficial.

Recommendations

Understand the users and their ecosystem

The first step to developing appropriate digital solutions is understanding as well as possible 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 needs of these users can be especially challenging since they might live in completely different worlds, literally and figuratively. However, given that low-skilled and low-literate people often experience many stressors and vulnerabilities, it becomes even more critical to try to develop empathy when designing with them.

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 local leaders and community experts; their needs and pain points; and their motivations and aspirations. A better understanding of the end-users can lead to better-designed products. Asking the **right questions** will help to build a good picture of the users and their ecosystem, for example:

Guiding questions about the core target user(s)

- Who is the **core target user**, the person 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 might send a mother a series of maternal health SMSs and 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 their **demographics**? For example, what are their education and literacy levels? What are their **technology usage and digital competences** (the focus of the next guideline)?
- What are their particular **needs** and how are they currently being met, or not? What are their **behaviours and daily routine** with regard to the particular need being addressed? What or who are potential **knowledge sources**, and are there bottlenecks to accessing those sources?
- What **motivates** the person to meet the need? What are their **attitudes and aspirations**? For example, a child may be focused on completing schooling, but his or her parents may aspire for the child to continue to study to postgraduate level. Understanding the bigger goal – a professional job as opposed to receiving a school completion certificate – can be very useful for the design of digital solutions and advocacy campaigns.

Guiding questions about the 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 they **navigate technology and written** text. With whom do they consume content – the **infomediaries** – and what role do these infomediaries play?
- Who **influences behaviour**? For example, a woman's husband might filter her information access or a community leader might support digital classes for all.
- Who are the **trusted people and agents** in the community? In sum, who else around the target user(s) needs to be considered in the understanding and design of the solution?

Guiding questions about the 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.

Answering these questions involves significant research, some of which can be done virtually and some done in the field, as explored next.

Follow best practice user-centred design approaches

There are many tools and practices 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-centred design is an approach to digital solution development that is driven by the needs, capabilities and context of 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. Ultimately, all research should shed as much light as possible on the nature and extent of the need or problem being addressed.

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

- **Conduct desk research** to deepen the broad

understanding of the users and their context. For example, note at a national level the literacy rates and mobile uptake statistics.

- **Create user personas**, which are fictitious characterizations that capture, in a relatable way, the key attributes – such as demographics, knowledge, attitudes, practices 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 the stories written by the solution development team are validated through user research 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. While low-level wireframes and paper prototypes may lack fine-grain details, they have the advantage that they are a very cheap and proven way to **quickly test high-level concepts with users** without distracting them with details about aesthetics. In particular,

these low-fidelity artefacts allow developers to get preliminary feedback on the extent to which the overall UI, including its navigational flow and language, is consistent with the users’ mental models. At the very least, the artefacts support discussions with users to better understand the issues at hand.

- **Test content**, a critical component of the design process – described in the next guideline.

A key principle of user-centred design is iteration. Based on initial understandings and research, prototypes are developed on which users try to give feedback. 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

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 activities 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 CHWs from a local implementing partner.

The entire user-centred 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



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 various 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 waste 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.

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

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 (Thies, 2015).

- 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 interpreters and facilitators to assist. If these are 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 an interpreter (Dell et al., 2012).

- 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 **time and budget constraints** 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 organizations embedded in the local community with staff who speak the language.
- **Provide sufficient training** and briefing to local facilitators.
- Where possible, **conduct field studies in familiar but neutral and distraction-free spaces**, where participants can feel freer to provide honest responses.

02

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. Supporting the advancement of users' digital skills and competences through benchmarking and tracking skills development is recommended.

Recommendations

Support the development of digital skills and competences of users

Digital solutions must be designed around users' capabilities, primarily their literacy, numeracy and digital skill levels. Since skills are developed through digital usage, it is desirable to design learning opportunities into the solution – its UI and content – so as to maximize the learning impact. In this sense, it is ideal to think about not 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 the same way, objectives can be set for digital skills and literacy improvement. Setting such goals, which

could align to key points along the learning pathway or assessment scores, will focus efforts to develop user's competences.

UNESCO is in the process of developing a *Digital Literacy Global Framework*⁵ for the monitoring, assessment and further development of digital literacy that is sensitive to different developmental contexts. It offers a pathway-mapping methodology that is useful for setting and managing digital literacy skills goals. More broadly, the ITU's *Digital Skills Toolkit*⁶ provides practical information and examples to enhance digital skills development policies and programmes.

- Offer **content in the local language** of the users. The dominance of a few major languages, such as English, and dearth of those spoken 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.

⁵ See gemreportunesco.wordpress.com/2018/03/19/a-global-framework-to-measure-digital-literacy

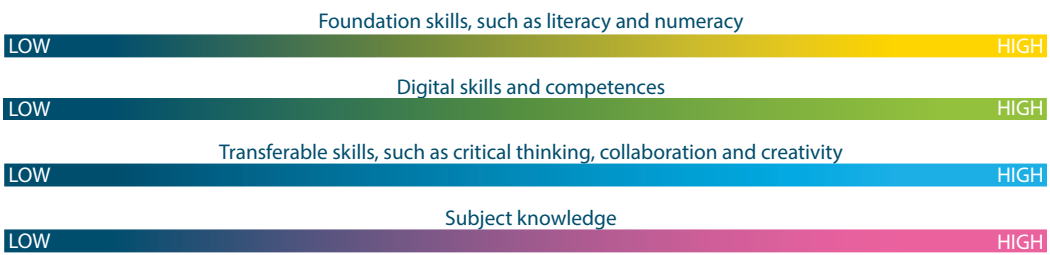
⁶ See www.decentjobsforyouth.org/wordpress/wp-content/uploads/2018/04/Digital-Skills-Toolkit.pdf

Benchmark and track the digital skills and competences of users

UNESCO recommends gauging and benchmarking the digital skills and competences of target users. This not only enables apps and services to adequately meet user capabilities, it sets a baseline from which skills improvement can be measured. With continued usage of technologies, digital skills improve, which can motivate users to use the technology still more. In an iterative development

approach, changing user capabilities have implications for the ongoing redesign and features to be added to a digital solution.

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



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. This should ideally be 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* (European Commission, 2017) 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 European citizens. UNESCO’s draft Digital Literacy Global Framework offers a worldwide tool, while another example is the *Basic Digital Skills Framework*⁷ developed in the United Kingdom.

- **Collect and analyse relevant usage data** to track skills development. For example, if a user gradually uses more sophisticated features successfully 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 onerous task, as long as it is designed in from the start. It may be necessary to personalize the user experience by requiring users to register. While this adds a one-off layer of complexity to the user experience, it also provides an opportunity to offer a tailored view of the digital solution to the user.
- **Conduct pre- and post-usage tests** to track skills, as with the Medic Mobile case study. These results can complement the usage data to paint a more complete picture of each user.

⁷ See www.thetechpartnership.com/basic-digital-skills/basic-digital-skills-framework/basic-digital-skills-framework-2015



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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 CHWs who 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. This also informs its practice of pairing low-literate with higher-literate CHWs, to provide peer support.

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

03

Ensure the clarity and relevance of content 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 trustworthy by the target audience. Having content created by the end-users themselves can help in this regard. Content should also be designed for group or mediated digital usage.

Recommendations

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.

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, preferences and skill levels. For example, health content can be targeted simultaneously at mothers and fathers, with each message presented in an appropriately tailored fashion.

- **Clearly define the content purpose**, such as whether the aim is simply to inform or to 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

CASE STUDY

Message
volume,
placement
and format
influence
uptake

The Talking Book, a ruggedized audio player and recorder by Amplio (formerly Literacy Bridge), offers agricultural and livelihood information to 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, Amplio found that earlier messages in a content category are played more frequently than later messages. Creative content such as songs and dramas also receives 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.

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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.

- **Co-develop content** with the end-users to ensure that it is understandable and context-appropriate, and **pre-test** early content versions.
- **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.

- **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.

Create content that is simple, clear and trustworthy

Creating content that is simple enough to understand, but rich enough to inform, change behaviour and educate, is challenging. Further, the content needs to be trustworthy 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 words and grammar, 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**. MIRA Channel, the subject of a UNESCO-Pearson

case study, includes a mobile health app that 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 livelihood activities affect everyone in a community or family.
- Low-skilled and low-literate people are often afraid of technology. **Build in help or instructions** about how to use the content and the solution, to reduce confusion and fear (see Guideline 5 for more on this).

- Because low-skilled and low-literate users are distrustful of technology, establishing a sense of **credibility** 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 livelihood information to rural farming communities, the non-profit organization 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.
- One way to ensure contextualized 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, and 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 2 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.
- Because many people 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 those should be used in instructional videos.

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 livelihood information in fourteen countries, via audio and text.

As a part of the message style testing, research sessions are carried out 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.

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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' rather than '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**, helping them **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 – in controlled environments such as focus groups or in real-world user settings – is necessary.

Design content for group or mediated digital usage

In general, digital solutions are designed for individual usage scenarios. However, technology is often shared among low-skilled and low-literate users, and used in group or mediated scenarios. Shared usage 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 among 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 (Takeuchi and Stevens, 2011).

- 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.

04

Use 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 using 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 the devices to which they mostly have access, what the local infrastructure supports and what they can afford.

Inclusive design for all

While the guidelines do not explicitly focus on persons with disabilities, within the broader goal of digital inclusion UNESCO recommends that accessibility guidelines and standards are followed when developing digital solutions. Accessibility affects content as well as UI, and benefits persons with and without disabilities, including people with low literacy and new users (W3C, 2012). The *Guidelines for Accessible Information* (European Agency for Special Needs and Inclusive Education, 2015) and various guidelines from the W3C's Web Accessibility Initiative provide ways to create more inclusive digital solutions for all.

Recommendations

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 (short message service) or USSD (unstructured supplementary service data) 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 among 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 realized that many of the women they were trying to reach could not 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 who 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 services such as Amazon's Alexa, is also increasing for the wider developer community – although the languages supported will be limited to mainstream ones for some time.
- 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 categorizing digital solutions.

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 (Anderton, n.d.). 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 if design elements are missing on some screens, such as navigation buttons or text, it 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. It is preferable to keep visual clutter to a minimum by not showing too many elements on one page or screen.
- Designing for easily intimidated audiences means the UI must **provide constant feedback** to reassure the user of their actions. Further, where content is played, for example as audio or video, the **speed must be adjustable by the user**. Allowing users to pause and repeat content makes it easier for them to consume content in a way that supports reflection or discussion.
- **Where possible, minimize menu hierarchies and offer linear navigation.** Low-skilled and low-literate users do not always realize that scroll bars lead to more content hidden offscreen. Minimizing the set of menu options and presenting them in a flat structure, where possible, is helpful.
- Usability extends beyond the UI and thus it is important to design solutions that are sensitive to low-resource settings. In effect this means **minimizing data load** as much as possible, allowing for **offline usage** so that users can download/upload data when a connection is available; and implementing **responsive design** so that apps and services work on a range of devices, including low-end ones.



CASE STUDY

Design for users' particular context

ABALOB I is a suite of mobile apps that targets small-scale fishers – both men and women – from South Africa's coastal communities along different stages of the service chain, from harvest to post-harvest activities. In fine-tuning the UI and user experience of the mobile apps, one key design aspect the team had to consider was that South African fishers work in cold waters and develop pronounced calluses on their hands. The team took account of this reality amongst its users by choosing to move to large checkboxes, drop-down arrows and other clickable icons, interface features more usable by those whose fingers have low sensitivity.

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05

Provide 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 with usage. For example, even for the 3-2-1 Service, whose IVR system requires the user only to listen to a range of options and press a number to make a selection, 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.

Recommendations

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. This can be especially useful to low-skilled and low-literate users. The 3-2-1 Service is trialling a game to teach first-time users how IVR works before they actually use it to access the service.
- Provide **machine-automated support**, such as auto-correct of text, auto-suggest or auto-complete of words being entered – features already found in smartphones. Such features often use artificial intelligence (AI), which increases their ability to provide support the more they are used.
- Potentially use 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.

Maximize the human elements in training and support

Training and support provided by individuals gives a human face to technology interaction. In the projects featured in the UNESCO-Pearson case studies, CHWs, volunteers and project team members provide face-to-face support to end-users.

To maximize 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), subject of a UNESCO-Pearson case study, 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 poorly resourced health facilities.
- **Leverage existing human networks** for tech support and raising awareness. Many of the UNESCO-Pearson case-study projects work through existing agent networks, or draw on close groupings 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 become early adopters and 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, including librarians and community centre staff, can be trained to provide tech support as well as on-the-spot training.
- Where it is desired to change users' behaviour, ongoing engagement is often necessary. Equally important is messaging that clearly

links the use of digital products and services to the **aspirations and motivations of users**. In the case of the Read to Kids initiative in New Delhi (Crane and Smith, 2018), whose aim was for parents and caregivers to read stories to children from their mobile phones, many users stopped or reduced their use of the app soon after initial training. They only used it regularly after a programme of sustained additional training based on messaging that clearly connected the benefits of reading with parental aspirations.

CASE STUDY

Build local support capacity amongst existing human resources

Nano Ganesh is a mobile phone-based remote control and monitoring system for agricultural 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.

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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 organization 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.

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

06

Constantly monitor, measure and improve

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

Recommendations

Ensure appropriate data are being collected and tracked in safe and accountable ways

Where possible, it is ideal to build user profiles – of individuals and/or segmented groups – so as best to understand whether or not the digital solution is meeting their needs, as well as whether it is meeting project goals. Establishing measures to collect and analyse data responsibly is critical to protect users and the organization 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 infringement of users' privacy. 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 (2017a) recommends having i) a user view, to understand how users engage with the digital solution overall; ii) a content view, to determine for example which content is accessed more or less, and 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 practices (United Nations, 2014) are followed to protect the data collected about users and to be completely transparent about its intended uses. 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 organization conducting data analysis must ensure that the data as well as the analysis of it are open to public scrutiny. Of course this must be done in a way that does not compromise the privacy of the users. Further, the onus is on the organization to explain to the end-users – in easily understandable ways – the source of the data, the logic of the data analysis and the findings.
- **Complement automatically collected data with human feedback.** Automatically collected data might 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.

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. Analysed data can be presented to the actual users, from refugees to government officials, so they can use it for example to improve livelihood activities. The following activities are recommended:

- **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, which informs the treatment they receive or administer. Each of the three user groups – mothers, CHWs and district officials – interfaces 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.** That end-users are low-skilled and low-literate, and interfacing with often very simple solutions, does not 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 them 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 to be 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 government interventions triggered at a district or state level. Collecting, analysing and passing on the data creates a potential revenue stream for the solution provider.

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



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. False positives are sent to the persons administering the test (the screeners), and tracked to see whether they record these as legitimate responses from the patient, to create an individual screener quality index. The index acts as a measure for quality control, and system reports inform supervisors about screeners who need further training.

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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, guidelines and recommendations are shaped and sharpened. Ideally the organizations 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 on the UNESCO-Pearson Initiative website: en.unesco.org/themes/literacy-all/pearson-initiative. All feedback will be considered for inclusion on the site.

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In a rapidly digitising world, people who cannot read or write face new forms of marginalisation. On top of confronting disadvantages in the physical world, illiterate people—currently 10 percent of the world's population—have difficulties participating in digital realms and accessing services that can strengthen livelihoods and enlarge learning opportunities.

Yet this exclusion is avoidable. Carefully designed digital solutions can help people—even those with very low literacy levels and nascent technology skills—navigate digital spaces and benefit from relevant applications, such as those targeting farmers or connecting users to health service.

This publication puts forward clear guidelines to help today's technology pioneers build more inclusive digital solutions.

The guidelines will help governments, NGOs, international organizations and private sector companies produce content for people with limited education who are new to digital environments, thereby opening life-changing portals to information, social services and community engagement.

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