# A lifeline to learning

Leveraging technology to support education for refugees

UNESCO Education Sector

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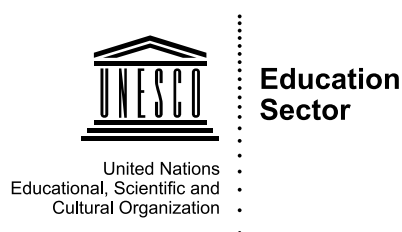
The Global Education 2030 Agenda

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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Executive summary

Background, scope and goals

The issue of provision of education and related services for refugees is complex and multifaceted. With a record number of 65 million individuals who were forcibly displaced worldwide in 2016, the magnitude of the refugee and displacement crises is unprecedented (UNHCR, 2017). Particularly alarming is that children make up more than half of the 22.5 million refugees, i.e. those individuals who fled their countries to seek protection elsewhere. The repercussions in the field of education can be quite severe. Immediate, strategic and sustainable educational responses are required to ensure that refugees and displaced populations have access to equitable and inclusive quality education and lifelong learning opportunities.

The increased access that refugees have to digital mobile technologies suggests that leveraging these tools more frequently and in a systematic manner could be a source of support for education delivery, administration and support services in refugee contexts. In fact, the number of refugee projects and initiatives that involve the use of mobile technologies is growing. This report analyses current experiences, lessons learned and emerging practices in mobile solutions in the field of education for refugees, with a view towards assessing opportunities and challenges and informing the way forward.

Different, continuously emerging definitions of mobile learning exist. In this report, mobile learning is defined broadly as education that involves the use of mobile devices to enable learning any time and anywhere, with a particular focus on mobility and its unique affordances rather than on technology per se. It includes questions about how mobile devices can support not only learning but also broad educational goals such as effective education administration and information management (Vosloo, 2012, p. 10). A comprehensive interpretation of what constitutes mobile learning includes learning across formal, non-formal and informal settings, and in camps and urban areas. Also, it encapsulates notions of situated and participatory learning, both online and offline, and with a wide range of mobile media while learners are stationary or on the move.

The report focuses on persons who have been forced to leave their country to escape war, persecution or natural disaster and who experience learning during a variety of phases ranging from dislocation and journey to arrival and integration in new, provisional, protracted or more durable host country settings. However, after initial searches returned only a limited number of papers and projects, some of the arguments have been additionally bolstered with a selective number of studies and reports on groups with characteristics similar to refugees, i.e. people displaced by emergencies and/or fleeing socio-economic hardships.

Approach and structure

To comprehensively capture the potential of mobile technology in education for refugees, the research integrated different methodological approaches including systematic searches of academic databases, selective web searches and semi-structured interviews with experts, practitioners and refugees involved in mobile learning projects and initiatives.

In this report, the analysis of mobile learning projects and practices is structured alongside ten education-related challenges,[1] grouped into three main categories:

- **Individual:** Challenges that can negatively impact refugees' learning and teaching opportunities, as well as their lives beyond the learning environment. These include the lack of language and literacy skills; the disorientation that might be caused en route and during the integration process in new environments; trauma and identity struggles; and exclusion and isolation.

- **Education system:** Challenges that transcend individual education levels and domains and stem from issues in the education system more broadly. These include the unpreparedness of teachers to meet the demands of working with refugees; the lack of openly available, appropriate and adequate learning and teaching resources; and the lack of documentation and certification mechanisms for displaced populations.

- **Educational levels:** Challenges that pertain to the different levels and types of education, including limited access to good-quality primary and secondary education; obstacles to vocational training and labour market participation; and restricted higher education access.

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1   It is worth noting that there are other education-related challenges such as infrastructure and connectivity. However, in this report the focus is on the primary challenges emerging from collected data.

Findings: Mobile learning to address refugees' education and learning challenges

Addressing individual challenges

This report shows that mobile solutions play a key role in refugees' informal learning. Underpinning the definition of informal learning as 'learning that occurs in daily life, in the family, in the workplace, in communities and through interests and activities of individuals' (UNESCO Institute for Lifelong Learning, 2012), these practices of refugees' informal learning include information gathering and **problem-solving in new environments** during and after flight, and the development and maintenance of social networks across multiple contexts. Such networks help **address isolation** and hold significant learning potential from participatory and connectivist viewpoints (Siemens, 2005). However, there is no evidence demonstrating that the sole utilization of mobile media results in better integration of refugees into the mainstream cultures of their new host countries.

Although **low language and literacy skills** can be the most pervasive and potentially damaging barrier to educational participation for a refugee learner, to date there is little evidence that documents the efficacy of specific learning and literacy apps in refugee settings. Mobile-enhanced conversational and situated learning scenarios deserve further analysis, as some examples in the report indicate.

The use of mobile technology can be a strong complement to intensive face-to-face engagement when refugees are experiencing severe **trauma and mental health** difficulties. Some findings in the report indicate that mobile learning applications and programmes can support refugees' knowledge acquisition while enhancing their psychological well-being. Moreover, mobile digital storytelling is helping refugees with their **identity (re)development processes**. While these findings are promising, further research is required to build the evidence base in this area.

Addressing education system challenges

To date, there are few projects and formal studies on **mobile teacher training** in refugee contexts, despite the fact that there is a great need for teachers and educators who are prepared to respond to the unique needs of refugees across all levels of education. Emerging project findings are beginning to illustrate how mobile micro-content and mobile messaging can be used to facilitate ongoing support and help teachers improve their teaching practice.

The scarcity of instructional resources that teachers and learners can use in the classroom and beyond is also a common issue in crises situations. Although some digital content for refugees is available in the form of **open educational resources (OER)**, it is often scattered and unaligned with the education systems in which it is used. Furthermore, quality control processes for new OER and evaluation mechanisms for existing OER are often absent. This makes it difficult for teachers in refugee contexts to identify, evaluate and reuse OER. Finally, there is an unmet demand for relevant digital content in languages other than English.

The findings also indicate that digital technologies that capture and analyse education data can play an essential role in improving basic operational, planning and controlling **functions in education systems** in refugee and crisis settings. However, current technological (and political) structures infrequently **document, certify or acknowledge refugees' prior educational achievements or current progress**. Another barrier that requires attention is represented by refugees' disrupted educational trajectories as they move across different areas.

Addressing challenges related to educational levels

The value of mobile learning to enhance refugee children's opportunities in **primary and secondary education** remains underexplored. This is because most projects have not reached scale, nor has their impact been rigorously evaluated. Very few evaluations point to the potential of mobile applications to support skills development in specific subject areas, such as mathematics, or to enhance refugees' connected and lifelong learning. Despite the relevance of cultivating refugees' **job-related and vocational skills**, few of the identified projects use mobile media to support vocational training.

Mirroring a broader trend, the use of massive open online courses (MOOCs) has also started to flourish in refugee **higher education** settings. However, the analysis shows that the success of digital learning courses in refugee higher education contexts has little to do with magnitude, openness or exclusively online delivery. Instead, digital higher education courses tend to be most valuable if they are connected with blended learning approaches that provide additional online and offline learning and support structures, and if they are integrated into a broader curriculum that leads to certification and degrees.

Lessons learned and perspectives

This report identifies a diverse **range of mobile learning projects and practices**. Projects and studies were found across all continents, with interventions designed for early childhood to higher education; low and high income settings; formal, non-formal and informal learning; urban and rural environments; and situations before, during and after refugees flee their homes. While the diversity of contexts makes it difficult to generalize findings, there are insights that transcend individual settings and, if localized, can provide guidance for future implementation of mobile learning initiatives.

One of the key observations is that successful projects often integrate different forms of online and offline learning into wider **blended learning** designs. These incorporate mentoring and peer support mechanisms and draw on **learner-centred pedagogies**. To facilitate the transformation towards learner-centred instruction, teachers of refugees typically require specific training and ongoing support. This goes beyond the acquisition of technical skills and calls for a transformation of their perception of teaching and learning altogether. Additionally, refugee learners tend to be overwhelmed by constructivist and peer learning approaches and more at ease with teacher-centred pedagogical methods. Thus it is necessary to delineate clear pathways for learning progression in a manner that enhances their ability to engage in self-directed learning over time.

Another pattern to emerge is the integration of **mobile social media and mobile instant messaging** spaces in educational designs, although how to obtain big data from instant messaging apps remains a problem. These simple platforms, which are increasingly available to refugees across a wide range of settings, can connect spatially distributed resources, learners and educators. Moreover, mobile social media can help promote refugee participation in digital education courses by reaching learners who have previously been excluded from such opportunities.

In addition to enhancing formal education designs, refugees would benefit from systematic approaches that strengthen their capacity to leverage mobile technology across non-formal and informal learning settings. This is particularly relevant because refugees' capacities to leverage informal mobile learning opportunities are not equally distributed, and this imbalance might further disadvantage some of

the most vulnerable groups and cohorts. Digital literacy skills for refugees go beyond the mastery of technology and need to include skills related to creating secure and private communication spaces, an issue that is particularly relevant to the many refugees who fear reprisals and surveillance. To this end, programme designers need to consider safeguarding mechanisms for education apps and other digital tools targeting refugees. In addition to digital literacy skills, approaches that help refugees **cultivate digital competencies, including coding**, warrant further systematic exploration. These skill sets are beneficial not only because they open up refugees' chances to enter local and global labour markets, but also, as some examples in this report have shown, because they enable refugees to drive the development of mobile learning solutions for themselves and their peers.

Conclusion and outlook

As mobile technologies and media play an increasingly central role in refugees' lives, further research is necessary to document the opportunities, shortcomings and impact of the use of mobile learning solutions in the context of education for refugees. The insights identified in this report must be bolstered by research that examines pedagogical impact while critically assessing the cost-effectiveness of mobile learning interventions for refugees, especially as more initiatives move to scale up from pilot or proof of concept phases.

As technocentric designs are unlikely to benefit refugees in equitable and inclusive ways, there is a need to establish broader 'ecological' approaches that account for diverse technological, sociocultural, political and financial aspects of education contexts involving refugees. These approaches, which require collaboration and strong connections between existing resources and actors, can perhaps be time-consuming and resource-intensive. However, the ultimate goal of providing equitable and inclusive quality education and lifelong opportunities to refugees is better achieved when stakeholders work in concert on the basis of the unique needs of the persons they serve.
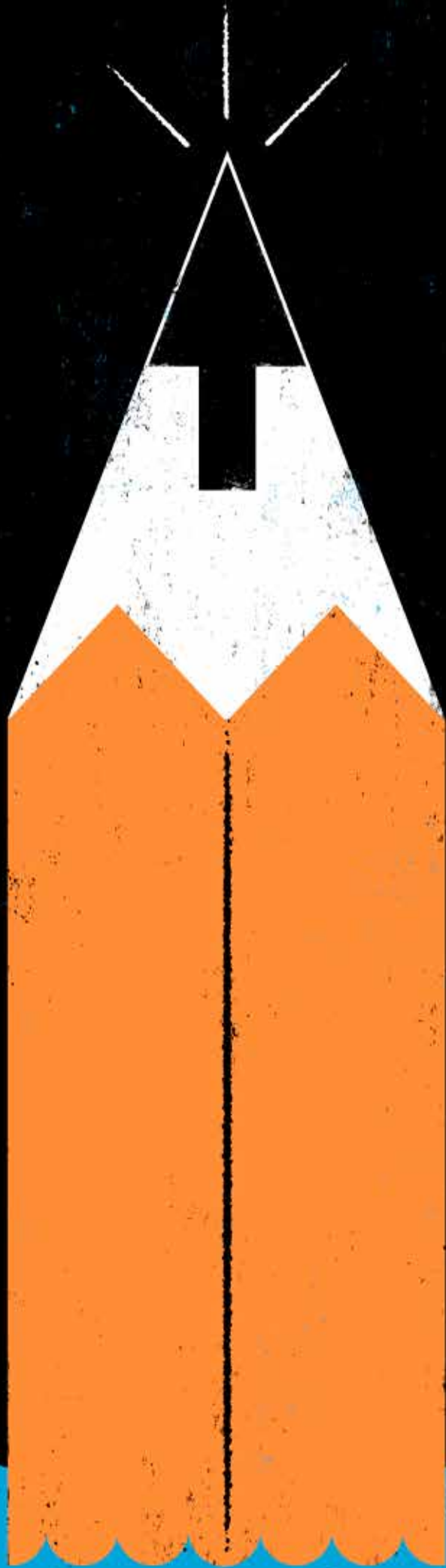
Introduction and background

Introduction and background

The number and assortment of displaced people worldwide is unprecedented. In recent years, the heightened magnitude of the crisis has fuelled the demand to harness digital technology to improve learning and teaching in refugee and displacement contexts. Efforts have been made to leverage mobile learning to counteract the negative repercussions of displacement on education access and attainment, as well as to build foundations for peace, stability and future prosperity. This report will consider existing evidence, scrutinize ongoing projects and initiatives, and reflect on emerging practices, with the goal of helping people working with refugees leverage mobile solutions to ensure inclusive and equitable access to quality education and lifelong learning opportunities.

Magnitude of current refugee and displacement movements

The record number of 65 million individuals who were forcibly displaced worldwide in 2016 due to persecution, conflict, violence or human rights violations is the highest since the end of the Second World War (UNHCR, 2017). Of this number, 22.5 million persons were refugees who fled their country to seek protection elsewhere.

Although Germany, the United States and Sweden receive the most applications for asylum, developing countries in Asia and Africa carry the heaviest burden, currently hosting 86 per cent of the world's refugees under the UNHCR's mandate. Turkey, Pakistan and Lebanon top the list of host countries, with 2.5 million, 1.6 million and 1.1 million refugees respectively. The increase in the number of refugees in urban areas is also a current trend, as six out of ten refugees presently reside in urban settings (UNHCR, 2016b, p. 53).

The magnitude of the current refugee crises is unprecedented. Particularly alarming is the rising number of displaced children, who represent about half of the refugee population.

The number of children on the move is steadily rising. About 28 million of the 50 million children who have been forcibly displaced or have migrated across national borders were escaping violence and insecurity, and more than 11 million fall in the category of child refugees and asylum seekers.

This makes nearly one in every two hundred children in the world a refugee (UNICEF, 2016). An increasing share of refugee children are detached from their parents: the number of unaccompanied or separated children who have applied for asylum worldwide has reached a new record of 98,400 (UNHCR, 2016b).

The average duration refugees are in exile is about twenty years.

The long timespan that refugees spend in exile can have devastating consequences and is certainly cause for alarm. Protracted refugee situations – settings in which refugees continue to be in exile for five years or more after their initial displacement – have been rising steadily in the past decades. The average duration of major refugee situations has increased from nine years in 1993 to seventeen years in 2003 (UNHCR, 2004) and twenty-six years in 2015, while the average duration that refugees spend in exile is about twenty years (UNHCR, 2016b, p. 20). This time span, which is longer than an entire formal education cycle and can cover large parts of a person's working life, clearly underlines the shortsightedness of all provisional solutions or quick fixes. This reflection is further reinforced by the acknowledgement that the global refugee movements will not die out in the near future. To the contrary, predictions indicate that the number and extent of the crises are likely to increase, with climate change being one key catalyst. Although current estimates have limitations and should be viewed with caution (Gemenne, 2011), the more robust approaches estimate that around 200 million people risk becoming climate refugees by 2050 (Biermann and Boas, 2010, p. 72; Gemenne, 2011).

Future developments, particularly climate change, are expected to dramatically increase refugee and migration movements.

The role of education as a strategic response to displacement

To ensure that refugees have access to equitable and inclusive quality education and lifelong learning opportunities, long-term approaches to education delivery in contexts with displaced populations are clearly needed. Strategies need to transcend the predominantly provisional measures and

confined spans of current initiatives. In addition to traditional humanitarian support focusing on refugees' physical needs, it is increasingly important to incorporate the integral social and community development of refugees and other displaced people, as well as to address their aspirations, ideas and dreams through education, irrespective of their context. Education is not only one of the highest priorities of refugee communities (Dryden-Peterson, 2011, p. 6) but also one of the most important factors that can help them realize a brighter future and integrate in hosting societies. In the short term, education can bring stability to disrupted lives; address the psychosocial needs of children, youth and entire communities; and help refugees in developing much-needed language and literacy skills. Education has also been positioned as one of the primary drivers to realize the Education 2030 Agenda for sustainable development. Sustainable Development Goal (SDG) 4 aims to 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all' by the year 2030. This encompasses refugees, who are among the most disadvantaged groups when it comes to access to quality education. Given the millions of displaced people of all ages and the fact that half of all out-of-school children live in conflict-affected countries (UNESCO, 2013), it is imperative that education provision forms a central part of the solution to the current crisis.

> Natural disasters, pandemics and conflicts, and the resulting internal and cross-border displacement, can leave entire generations traumatized, uneducated and unprepared to contribute to the social and economic recovery of their country or region. Crisis is a major barrier to access to education, stalling and in some cases reversing progress towards the Education for All (EFA) goals in the last decade. Education in emergency contexts is immediately protective, providing lifesaving knowledge and skills and psychosocial support to those affected by crisis. Education also equips children, youth and adults for a sustainable future, with the skills to prevent disaster, conflict and disease.
>
> UNESCO: Education 2030: Incheon Declaration and Framework for Action

In the long term, education can trigger social and economic improvements and produce leaders who will guide their communities out of stagnation and hopelessness towards prosperity, stability and peace. Educational responses in host environments should ensure that forcibly displaced children and youth are included in national education systems and provided with accelerated and flexible education options that meet their highly unique educational needs. This includes not only primary settings but also the flexible delivery of skills-based post-primary education. Educational spaces that put

refugee populations in contact with learners from mainstream cultures also serve as a key vehicle for integration in the host countries. Finally, host environments need to ensure an adequate supply of trained and motivated teachers, including provisions for regular payment, acquisition of specific qualifications and opportunities to advance in their careers (UNESCO and UNHCR, 2016).

However, addressing the demands presented by the refugee and displacement crises can be overwhelming for education systems worldwide. The majority of displaced people reside in developing countries, which have limited resources even for their own citizens (UNHCR, 2016b). The lack of specific educational planning to integrate new and unexpected arrivals may also exacerbate pre-existing issues with the provision of primary and secondary education. Also, even when planning takes place, the available funding is often scarce. Worldwide, the education sector receives only a small share of the overall humanitarian aid budget. For instance, in 2013 this portion was equal to 2 per cent (UNESCO, 2015a, p. 275).

The relevance of mobile technology

To understand the relevance of mobile learning solutions in the context of refugee settings, there is a need to examine whether such an approach makes sense given the resources available to displaced people. Today, about 86 per cent of the world's refugees reside in developing countries, and 71 per cent of refugee households own a mobile phone. While 39 per cent of households have internet-enabled phones, the remaining 61 per cent cannot benefit from applications developed for smartphones. The vast majority (93 per cent) live in places covered by a 2G mobile network, and 62 per cent are in reach of 3G mobile networks (UNHCR, 2016a, p. 12). However, the numbers vary considerably, with far lower levels of ownership and connectivity in rural settings.

Figure 1. Phone ownership among refugees

29%
Households without a phone

32%
Households with a basic phone

39%
Households with an internet capable phone
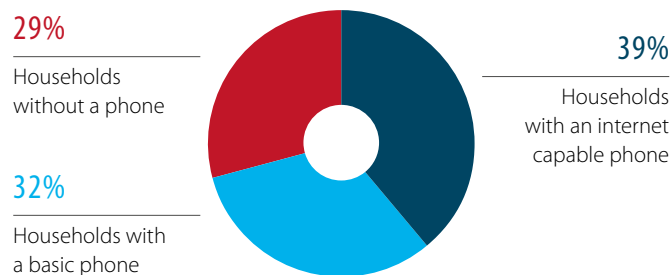
Source: Adapted from UNHCR, 2016a, p. 13.

Digital literacy rates of refugees vary across geographical areas. While Syrian refugees are seen as the most tech-savvy population of migrants in history (Rutkin, 2016), refugees in other areas are much less digitally literate. In addition, the availability of multifunctional smartphones does not automatically imply their comprehensive use. In fact, Syrian refugees tend to prioritize basic communication features, such as Facebook, WhatsApp or other messaging apps (Mason and Buchmann, 2016).

Figure 2. Connectivity of refugee households

93%
Refugee households living in areas covered at least by 2G mobile networks

62%
Refugee households living in areas covered by 3G mobile networks
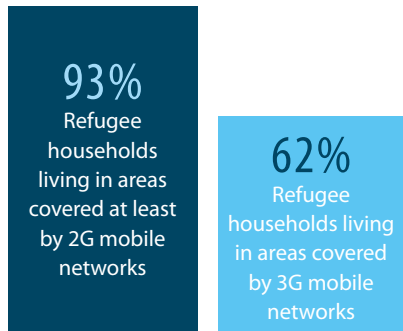
Source: Adapted from UNHCR, 2016*a*, p. 12.

Despite the urban versus rural disparities in mobile phone ownership and network access, mobile media remain relevant to refugees because they help connect displaced people with loved ones and friends at home, on the journey to be resettled, and once they reach their host countries. This demand to (re)establish connections with others is reflected in the creative ways in which displaced communities are appropriating technology, for example by building generators to convert USAID-donated cooking oil into electricity to charge their mobile phones so that they can be contacted and can contact others (Hughes, 2014). The relevance of mobile solutions is also operationalized by refugees who spend up to a third of their disposable income to stay connected (UNHCR, 2016*a*, p. 8), prioritizing this over spending on clothing, health care and education (UNHCR, 2016a, p. 15).

Among refugees, connectivity is often perceived as a basic need alongside education, clothing and health care.

The underlying assumption to be scrutinized in this report is that mobile-based solutions can be used in a context-responsive manner to address specific educational challenges and enhance learning opportunities in line with SDG 4 education targets.

The strategic role of education in crisis and displacement settings, and the increasing relevance and availability of mobile media, lays the groundwork for a more systematic use of mobile learning.

Systematic use of information and communication technology (ICT) for educational purposes in refugee contexts is still a relatively nascent and emerging field of practice and research. While prior reviews and landscape studies highlight the potential value of ICTs in crisis settings, they also reveal the lack of scientific evidence (Burde et al., 2015; Dahya, 2016). If mobile learning is to be considered a viable, effective and efficient way to help education systems cope with the challenges of the displacement crises, it is necessary to understand the challenges to be addressed, examine the evidence on whether mobile learning could make contributions, and draw on best practices and lessons learned.

Scope, structure and analytical approach

The report examines mobile learning projects and studies that reflect UNESCO's definition of mobile learning. Mobile learning can be defined as education that involves the use of mobile devices to enable learning any time and anywhere, with a particular focus on mobility and its unique affordances rather than on technology per se. It includes questions about how mobile devices can support not only learning but also broad educational goals such as effective education administration and information management (Vosloo, 2012, p. 10).

To cover the full potential of mobile learning, this report includes formal and informal learning settings and perspectives that range from cognitive to participatory learning viewpoints. This explains, for instance, why the analysis includes practices in which refugees use mobile solutions to organize work and strengthen their social and labour market participation.

Cognizant of the variety of refugee contexts, this report delves into the use of mobile learning in different phases ranging from dislocation and journey to arrival and integration in new, provisional, protracted or more durable host country settings. It also includes projects and studies from both refugee camps and urban areas as well as high, middle and low income contexts.

To understand current experiences and emerging evidence, the search strategy integrated different methodological approaches, including systematic searches in academic databases, selective web searches and interviews. While research and analytical work started in August 2016, participation in UNESCO's Mobile Learning Week in March 2017 allowed the authors to gather further insights and evidence to support and corroborate the emerging findings.

Peer-reviewed journal articles and conference contributions from scientific databases are used to provide rigorous evidence. Systematic and selective searches were carried out

in the academic databases Web of Science, PsycINFO, ERIC and Google Scholar. To do justice to the interdisciplinary nature of the topic, the Ovid search interface was used to search articles from diverse databases including PsycINFO (4 million bibliographic records centred on psychology and behavioural and social sciences), MEDLINE(R) (23 million biomedicine and life science citations) and ERIC (1.5 million educational literature records). The Web of Science Core Collection was used to access contributions from 18,000 high-impact journals. In addition, Google Scholar was searched using selective search approaches, because this database is estimated to cover 100 million out of 114 million English-language scholarly documents (Khabsa and Giles, 2014). For pragmatic reasons, the search focused on English articles. The main searches were carried out between August and October 2016.

Additional standard web searches were performed to capture online reports and relevant and innovative approaches to education for refugees not yet reviewed and documented in the form of research papers, including reports published by United Nations agencies and non-governmental organizations (NGOs). Insights and lessons learned were collected from project websites, blogs, practitioner journals and other sources of value. In total, forty-nine journal papers, twelve conference articles and forty-six reports were used in the present report, which features fifty-two projects and thirty-five digital apps and platforms. For a comprehensive description of the search and analytical strategies, please see the appendix.

To gain novel insights from the many burgeoning initiatives not yet documented and to include the experience of experts in the field, twenty-four semi-structured interviews were carried out, based on a pre-structured question guide. To be considered for an interview, subjects needed to belong to at least one of the following categories: (a) academic expert with a publishing record that matches the scope of the report; (b) specialist with a practice-based track record (either with extensive experience, i.e. overseeing and working in several projects and initiatives; or intensive experience, i.e. an in-depth involvement in one of the projects examined in this report); or (c) refugee who has created, worked with or learned with mobile learning solutions. The dynamic development of the field and the limited time frame made it impossible to interview all experts in the field. In part, the recruitment was based on chain sampling (Patton, 1990) and was opportunity-driven; for example, interviews were carried out with experts who were available during Mobile Learning Week 2017. The insights gained from the interviews were included in the report to enrich the descriptions of some projects with no online information or to support the general conclusion.

In addition, the findings from some of the interviews were used to develop case studies that characterize refugees' perspectives, including their challenges and experiences with mobile learning projects and initiatives. The case studies seek to foster an understanding about a particular situation and help readers grasp the specificity of refugees' education and learning contexts. They were selected with a view towards covering a broad range of learning environments including formal and non-formal learning settings, diverse geographical areas, and both urban and encampment contexts. Furthermore, the projects underlying these case studies had a significant number of users with scaling-up efforts already underway.

The central part of this report (Chapters 2, 3 and 4) organizes the descriptions of mobile learning projects and practices alongside ten key challenges in the context of education for refugees (see Section 1.5). The challenges, which have been identified in the literature and through interviews, are organized in a pragmatic way to synthesize findings on the potential of individual mobile learning projects and informal learning practices. Each section in the report focuses on one challenge and describes its educational implications. After assumptions and expectations for the project outcomes are contrasted with findings from the actual evidence base, the section ends with a reflection on the findings and a discussion of emerging mobile learning practices in this area that are relevant to understanding future developments.

The concluding chapter outlines lessons learned and perspectives gained from this review, with the aim of informing future mobile learning initiatives in refugee settings. It also highlights areas and needs that have not yet been covered but are, in view of refugees' needs, worthy of future exploration.

Organizing framework of the report: Refugees' educational challenges

Refugees represent a group of particularly diverse and disadvantaged learners. They are confronted with a plethora of challenges at all educational levels and in diverse circumstances. These challenges begin once refugees escape from their place of origin and continue with their experience living for protracted periods in provisional camp situations or resettlement contexts. Although this report cannot do justice to every challenge, it focuses on the most common and prevalent issues that can potentially be addressed by mobile learning. In total, ten key challenges, grouped into three different categories, have been identified and selected for this report (see Figure 3). Further, while it does not constitute one of the ten challenges used as an organizing framework for this report, the technology barrier constitutes an overarching limitation of mobile learning projects and initiatives, in terms of availability and maintenance of appropriate devices as well as connectivity.

Figure 3. Overview of key education-related challenges in refugee contexts

EDUCATION SYSTEM CHALLENGES	Scarcity of appropriate learning and teaching resources	Teachers unprepared for education for refugees	Undocumented and uncertified educational progression

CHALLENGES RELATED TO EDUCATIONAL LEVELS	Limited access to quality primary and secondary education
	Obstacles to vocational training and the labour market
	Restricted access to higher education

INDIVIDUAL CHALLENGES	Lack of language and literacy skills in host countries	Trauma and identity struggles	Disorientation in new environments	Exclusion and isolation

Source: Authors.

The chapter titled 'Mobile learning to address individual challenges' describes individual challenges that negatively impact not only refugees' teaching and learning opportunities, but also their lives beyond the educational sphere. These include a lack of language and literacy skills in host countries; trauma and identity struggles; disorientation in new environments; and exclusion and isolation.

The chapter titled 'Mobile learning to address education system challenges' focuses on three challenges that education systems, especially those of host countries, face in providing refugees with educational opportunities. These are the unpreparedness of teachers to meet the demands of working with refugees; the lack of openly available, appropriate and adequate learning and teaching resources; and the lack of documentation, credit recognition, transfer and certification policies and regulations for displaced populations, which can cause severe discontinuity in refugees' educational trajectories and also inhibit the management and planning of entire education systems.

The chapter titled 'Mobile learning to address challenges related to specific levels and types of education' discusses challenges across education levels, including limited access to good-quality primary and secondary education; obstacles to vocational training and labour market participation; and restricted access to demand-driven higher education that is applicable across borders.

A note about prior reviews

This report draws on and incorporates the findings of prior reviews. In contrast to some general reviews and reports on mobile technology (GSMA, 2017; UNHCR, 2016a), this report puts the education and learning of refugee populations in the foreground. Perhaps the most significant feature differentiating this report from prior work examining the use of digital technology for learning and education in refugee contexts (Dahya, 2016; World Bank, 2016), is the report's analysis, which is grounded in refugees' specific education-related challenges.

The scope of the report also includes informal learning opportunities and information access on the move, during interim or protracted conflict situations, and during the process of integration into new social, cultural and professional settings. The acculturation process has only been briefly touched upon in prior reviews, and its inclusion and discussion here represents a unique contribution to the current body of knowledge. Finally, from a topical viewpoint, this work has been able to include analyses of recent trends and developments in education technology that allow refugees to learn in situations marked by geographical mobility.

Mobile learning to address individual challenges

Mobile learning to address individual challenges

During flight, encampment and resettlement, refugees are confronted with a number of individual challenges that can negatively impact their learning and teaching opportunities, as well as their lives beyond the learning environment. These challenges can include:

- Lack of language and literacy skills in host countries
- Trauma and identity struggles
- Disorientation in new environments
- Exclusion and isolation

Lack of language and literacy skills in host countries

Scope of the challenge and educational implications

'καλωσόρισμα. Hoşgeldiniz. Herzlich willkommen. Bienvenue. Welcome.' One of the most immediate challenges experienced by refugees is a lack of the language skills required in host settings. Due to their high degree of geographical mobility, many refugees are exposed to a multitude of languages in and outside of education settings. However, they have limited chances to obtain academic mastery in any of them (Dryden-Peterson, 2015*b*, p. 1). Language skills, or a lack thereof, can also have an impact on the other challenges refugees face, including exclusion, disorientation, identity struggles and educational performance, as the following sections will demonstrate.

> *A lack of language and literacy inhibits refugees' chances to participate in formal education in host countries.*

School environments play an important role in facilitating language learning. However, language and literacy barriers are deemed to be one of the main obstacles preventing refugees from accessing and attending school, especially outside camp settings.

Studies highlight how refugee students with interrupted schooling often lack strong literacy in their mother tongue and struggle to cope with the language of the host country's education system (Brown et al., 2006; Miller, 2009). As Dryden-Peterson (2015*a*) notes, refugee 'children cannot learn if they do not know the language'. Even if they attend classroom

lectures, children still struggle to follow and understand teachers' instructions and explanations. For example, while Syrian refugee children in Lebanon are eligible to attend public schools, it is hard for them to follow lessons taught in English or French (UNHCR Innovation, 2016, p. 10). African refugees in Canadian high school settings say that teachers proceed too fast for them to understand. Additionally, self-consciousness about grammar mistakes or their accent inhibits their active participation in classrooms (Kanu, 2008, pp. 923–24). Finally, textbooks written in foreign languages, in particular science textbooks or texts using academic and subject-specific language, can be hard to understand (Kanu, 2008, p. 924; Miller, 2009). Bilingual dictionaries present only a limited solution, as refugees can be illiterate in their native language, and dictionaries in tribal languages are often not available (Miller, 2009, p. 583). In higher education settings, the requirement for advanced levels of written and spoken language competencies, mostly in English, hinders refugees' educational chances (Gladwell et al., 2016*a*, pp. 12–13).

> *Language barriers dramatically restrict refugees' opportunities to participate in new host cultures.*

Beyond formal education, refugees who have difficulty speaking the local language struggle to interact with people in their host setting and to express their most basic needs. Being able to speak the local language of the host setting is clearly pivotal to integration (Ager and Strang, 2008, p. 182). For example, refugees from diverse backgrounds in South Africa indicate that they hesitate to initiate conversations with their neighbours due to lack of confidence in their language skills (Bacishoga and Johnston, 2013). Low language skills can also result in difficulties accessing a wide range of services including medical, legal, education, government and transport services (Ngan, Lifanova, Rahman et al., 2016, p. 2; Watkins et al., 2012, p. 136). Typically, refugees have limited access to language instruction (Brunarska and Weinar, 2013; Valenta and Berg, 2010). When they do get access to language classes in their host countries, they might encounter multiple obstacles, such as lack of child care while they attend classes, low or no income to pay course fees, placement in a relatively rural or isolated area of the host country with few chances to practise the language, and the acculturative stress of simultaneously learning to navigate the society into which they have moved (Benseman, 2012). In essence, lacking language and literacy skills constitutes a cross-cutting key obstacle for refugees of all ages, which impacts success not only in school but also in other spheres of their daily lives.

Assumptions and evidence base

Mobile-assisted language learning apps are widely promoted as key tools for language learning. To this end, it is assumed that they hold significant promise to support refugees in their language and literacy skills development.

Yet the assumption that mobile learning could be the key vehicle for refugees' language learning and literacy skills development cannot be confirmed given the current quantitative and qualitative evidence base identified in this report. As the next sections show, no rigorous evaluations have been found to support the claim that mobile language learning apps can effectively support refugees' foreign language acquisition. Additionally, many apps that incorporate behaviourist language learning approaches are of questionable quality and often can be unsuitable for refugees who have limited literacy skills. While these findings do not dismiss the role that mobile learning can play in supporting refugees' language and literacy development, they raise questions related to the quality of the apps and the pedagogically sound use of mobile technologies. The assumption is that high-quality apps can assist refugees with language learning if they are integrated into an overall approach made up of formal courses and informal conversational practice or if they serve as additional learning materials.

Although pedagogically rich literacy apps for refugee children are presently in development and use, their impact has not yet been demonstrated. Another open question concerns the opportunity costs involved, as investigations from non-refugee contexts have found that mobile literacy designs are not necessarily more cost-effective than approaches that do not make use of ICTs.

Finally, automated mobile translation services are being used by refugees and can be effective as an initial language support mechanism, but their application is tied to the availability of devices with advanced features and good internet connectivity, which automatically excludes a significant number of refugees in low-resource contexts.

Current practices and projects

The following sections explore how mobile solutions can provide support for refugees' language and literacy challenges in three main areas: literacy development, foreign language learning and translations.

Literacy development

The **EduApp4Syria** competition is a major initiative that seeks to facilitate the development of literacy skills, with a focus on displaced Syrian children (Norad, n.d.). Following the deliberations of an international jury, the finalists of

the EduApp4Syria competition were announced: Feed the Monster, Antura wa al Huruf (Antura and the Letters) and SIMA; the first two, Feed the Monster and Antura and the Letters, were eventually selected as the winners. These three apps incorporate game-based learning principles and are aimed at Syrian refugee children with no or limited prior literacy skills. Each of the apps has protagonists with whom the users can identify. **Antura and the Letters** makes use of a pet and 'living letters' (represented in the game as wild creatures) that an old shepherd and his dog are watching over (All Children Reading, n.d.*a*; Neumann, n.d.). In **Feed the Monster**, players need to help friendly monsters evolve and prosper by solving short learning exercises (All Children Reading, n.d.*b*). In **SIMA**, learners support and accompany the title character, a courageous Syrian girl who embarks on a challenging journey that incorporates Syrian culture, myth and folklore (Kukua, 2016). These apps have in common their gamification approaches, considerations of socio-emotional issues and narratives that are closely aligned with refugee children's cultural backgrounds. The games can be used on smartphones, leveraging the high access rates of Syrian refugees to these devices and the popularity of gaming apps. Although the apps have yet to be rolled out and evaluated in the field, they were subjected to intense expert evaluation and pilot tests involving Syrian refugee children. According to the designers and evaluators, one of the key principles of success rests on the tight integration of playing and learning. Learning should not take place in separate spaces or sequences of the game but should be directly interlaced with the playing activities of the game (Bisignani, 2017). By playing, children should be immersed in the game without realizing that they are actually learning (Guardiola, 2017).

The provision of mobile and digital readers can help refugees further develop and practise their literacy skills, while countering the lack of reading materials available to them. To this end, the international NGO **Worldreader**, in partnership with UNHCR Innovation, facilitated the delivery of 30,000 books through e-reader devices, which were provided to 2,300 learners in Tanzanian refugee camps (Kwauk and Robinson, 2016). The digital libraries made possible through this intervention included titles from both local and international authors as well as textbooks and storybooks. During this pilot project, teachers are being trained to integrate e-reader usage into their lessons, and the refugee community are learning how to access the Worldreader library by using mobile phones already in their possession. To date, there has mostly been self-reported anecdotal evidence about the benefits of refugees using e-readers to learn in this context (UNHCR Innovation, n.d.*f*).

A large randomized controlled trial in non-refugee contexts in Kenya indicated that a non-digital reading intervention enhanced by the provision of mobile reading resources via e-readers resulted in significantly higher reading abilities

among the beneficiary students. While the enhancement that included the provision of e-readers to students (through tutors equipped with tablets) was more costly than the solely non-digital intervention received by the control group, significant gains were achieved through the approach (Piper et al., 2016).

Foreign language learning

As refugees settle in new environments, the acquisition of basic skills, if not fluency, in the host country language is a recurrent necessity that can be supported by the use of language learning apps.

One example is Duolingo, which identifies itself as the world's most popular language learning application. The app is available for free, and the creators of Duolingo crowdsource some of the language learning content by inviting volunteers who teach or speak one of the twenty-seven offered languages, including Greek, Turkish, Italian, German, English and French. Duolingo facilitates language instruction primarily through gamification and a diverse array of language learning activities such as multiple choice exercises and direct translation opportunities. Moreover, the platform gives users immediate feedback and encourages course completion by tracking users' language learning activities and testing their language learning development, eventually awarding digital badges for notable achievements. As the Syrian civil war led many refugees to flee to Europe, particularly to Germany, Duolingo began offering German language lessons for Arabic speakers, on the assumption that language proficiency could help them seek better opportunities (Ma, 2015). Today the app offers language learning courses for refugees from Arabic-speaking countries in English, French and Swedish as well (Duolingo, n.d.*b*). The evidence base on the language learning impact of Duolingo for refugees is yet to be established. A study on the efficacy of Duolingo for English speakers who used the platform to learn Spanish suggested that there were likely some benefits that could be derived by a student population who already had high levels of educational attainment (Vesselinov and Grego, 2012).

According to current systematic analyses, many of the existing language learning apps teach vocabulary in isolated rather than contextualized ways and have limited correction and adaption mechanisms (Heil et al., 2016). Even apps with higher levels of feedback and adaptability do not reach much beyond gamified drill-and-practice approaches (Schmidt, 2016, 2017). Similar patterns are found for apps that are geared towards refugees, as demonstrated by an analysis of Arabic language learning apps for refugees in Germany. However, these apps were deemed useful as vocabulary trainers, and many also help to train reading and listening skills (Stiftung Warentest, 2016).

Most language learning apps available to refugees support individual language practice and memorization. However, they would not be able to fully replace in-person language courses, where learners have more opportunities to engage in conversational learning activities.

An additional way to promote individual refugees' language acquisition is through apps that combine language learning with other informational or educational services for the purpose of integration and acculturation. For example, through the release of an app called **Ankommen**, which means 'arrive' in German, the German Federal Office for Migration and Refugees aims to support refugees' German language acquisition and provide information about life in Germany (Ankommen, n.d.). In an evaluation, the app was highly rated especially because the language learning is geared towards refugees' day-to-day needs and demands, particularly in the first weeks after their arrival. Interactive exercises help people learn how to spell words, understand numbers and provide information about their professional background (Stiftung Warentest, 2016).

Some projects target refugee integration through language learning promotion, leveraging the capacities of mobile devices to support contextual, multimodal and conversational forms of learning, and to bridge learning in and outside the classroom. The **MoLeNET** programme in the United Kingdom has realized learning designs in which refugees and immigrants document interesting artefacts in museums and upload and discuss them on a blog. Learners use their phones to engage in speaking activities with peers and teachers, to create personal visual prompts such as images and videos to aid vocabulary learning and writing, and to debrief and discuss the documented experience in the classroom (Savill-Smith et al., 2012). The designers of the app **MOIN**, which is in the pilot phase, seek to link German language acquisition with opportunities for refugees to chat with local people and learn more about the host country culture (Ngan, Lifanova, Jarke et al., 2016, p. 523).

Translation services

Refugees make use of mobile translation tools in their communications during flight and their initial integration into new settings (Kutscher and Kreß, 2016, p. 202). Gillespie et al. (2016) found that refugees use their mobile phones to access online translation services such as Google Translate. This on-demand translation app allows users to instantly translate typed texts. While not always completely accurate in the case of complex language transactions, the translations provided can be useful to facilitate simple information requests, such as the locations of specific places in town or where

to recharge mobile phones. For example, in one refugee integration programme in Canada, a combination of tablets, mobile phones and Google Translate has been used when interpreters are unavailable to help facilitate communication during initial registration of Syrian refugees (CBC News, 2016). Google Translate is also being used in medical settings in Canada, where questions or expressions are not only typed in and translated but also pronounced acoustically at the bedside on mobile devices (Pimmer et al., 2013).

In addition to automated translation tools, specific apps and mobile services directly link refugees with live translators. Some of them are developed by refugees themselves, who know exactly what sort of specific needs could be addressed. One example is Tarjemly Live, a simple iOS and Android app created by Syrian refugee Moujahed Akil with the goal of allowing refugees to instantly access live translation support in three languages: Turkish, Arabic and English. Tarjemly Live is simple and requires few digital literacy skills to make use of the translation and interpreting services that are offered twenty-four hours a day via voice or text. (See case study for more details.)

Mobile reading investments do not necessarily improve literacy outcomes significantly more than base non-digital reading investments.

Finally, Nowall (a reference to 'no wall', or no language barriers) is a tool being developed by a Sudanese refugee living in France, Adam Sakhr, in partnership with Techfugees France. The tool integrates a mechanism to provide refugees with interpretation and translation services from volunteers via Short Message Service (SMS). The decision to focus on SMS-based services was made because many refugees struggle to access smartphones. Even when refugees have access to such devices, they may not have the technical know-how to use them in ways that can support the completion of activities requiring French language proficiency.

Reflections and emerging practice

One of the key findings of this chapter is that most language learning apps are behaviourist in nature. In other words, learning with these apps is realized through reinforcement of knowledge. Learners are primarily passive, responding to learning content and tasks. That said, behaviourist approaches with high levels of interactivity can serve as valuable language learning aids – for studying vocabulary, for instance – if they are combined with other forms of formal and informal language learning and practice opportunities. For this purpose and as some examples have shown, the conversational and contextual learning capacities offered by mobile technology can be harnessed. This is particularly relevant because communicative practice is a key asset for

refugees and immigrants as they immerse themselves in a new language and a new society. Well-designed mobile language learning activities do not separate but rather connect refugees with mainstream cultures, helping them learn in authentic contexts.

Literacy issues form a key challenge that needs to be addressed more systematically. First, the current programmes that seek to facilitate literacy development tend to focus on children, whereas language learning apps for adults are less common. Additionally, mobile solutions are often not designed in a way that favours their use by refugees with weak or non-existent literacy skills, for example by drawing on image- and sound-based navigation (Stiftung Warentest, 2016). Another literacy-related need that has not been addressed is refugee learners' lack of access to comprehensible textbook content, combined with teachers' difficulties explaining this content to them. The analysis of the challenges related to these two points reveals that refugee students struggle to understand academic concepts, especially in the sciences. Simple explanations in the host language are usually the only way to help learners with low literacy skills in their mother tongue (Miller, 2009, p. 584). One possible approach to overcoming these difficulties is to digitize openly licensed materials for key science concepts and other subjects and embed them in digital textbooks. Finally, the cost-effectiveness of mobile literacy programmes needs to be examined in much more detail, especially in comparison with other non-digital approaches.

Web and mobile-based machine translation services are of value to refugees who own smartphones and can reliably access the internet. As devices and connectivity increasingly become available, refugees in low-resource contexts are likely to benefit from access to these tools in the not-too-distant future. However, the effect of these services on refugees' language competencies also needs to be evaluated critically in the future. The improvements in language recognition software and in neural machine translation services represent interesting recent developments. These emerging technologies have the potential to improve the quality of translation services via deep learning techniques, and could be of great value to refugees during the various phases of their journeys and resettlements.

An entrepreneur's perspective

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Moujahed Akil is a Syrian refugee and tech entrepreneur. After his escape from the civil war, he founded a company in Turkey and is now using his technical and entrepreneurial skills to develop digital and mobile solutions addressing the needs of other refugees.

Before the Syrian civil war, Moujahed Akil was a computer information science student and an IT freelancer living with his family in Aleppo. The war forced him to flee to Turkey, which proved to be difficult at the beginning:

> *'Not knowing the language was very hard because I could not even discuss the most basic things needed to start a new life in Turkey. For example, I went to the government building and there was no way to communicate. We used our hands and feet.'*

In these situations, the mobile phone was invaluable. Moujahed used Google Translate to understand relevant information and forms he had previously photographed. His

freelancing and coding skills helped him to find a job, and soon he started to work again as an IT freelancer. Working with Turkish friends and colleagues helped him learn the new language quickly.

Not long after fleeing Syria, Moujahed started his own business, Namaa Solutions, together with a friend. The start-up, which aims to address the needs of Syrian refugees in Turkey, has grown quickly and now has twenty-five employees. The idea for the company's first app, Gherbtna (which means 'our expatriation' in Arabic), was sparked because Moujahed was frequently consulted by less knowledgeable Syrian friends and colleagues about resettlement issues in Turkey. Over time, more than 1,500 text and video entries were developed for the app, covering a wide range of topics including legal and administrative

issues, job and skills development opportunities, banking, medical information and education. According to Moujahed, education is the most important category on the app.

'Many Syrian people are students who wish to continue their studies in Turkish schools and universities, and this is why education is the most relevant category on the Gherbtna app.'

The app provides information about schools and universities in which Syrian refugees can continue their studies, and lists the requirements and certifications needed to enrol. The second most popular category for Gherbtna app users is information about the laws and rules to be followed during the integration process. After these two categories, the most popular app element is the 'My story' feature, which is a platform where personal stories about Syrian refugees and their daily lives can be shared. For example, one of the stories illustrates the process of registering at a university as a female refugee student.

Besides the app, Gherbtna comprises a website and a Facebook page. The latter has a particularly important function, as Moujahed explains:

'The Facebook page is a very strong complementary component to the mobile app, and it allows us to directly interact with our users.'

The establishment and maintenance of the portal does not come without difficulties, as Moujahed explains:

'One of the key challenges is the lack of funding and of a sustainable business model.'

The app relies primarily on the efforts of volunteers. Current revenue streams are generated via Google's AdSense and a

section labelled 'Company guide', where Syrian companies in Turkey can list themselves and advertise their products. When asked to name the key success factor for Gherbtna, Moujahed states just one word:

'Needs. Addressing needs is the key success factor. Syrian refugees in Turkey want this information, and they can't find it in their own language, so this is where our app comes in.'

The idea for his second mobile app arose through another needs-based situation. As Moujahed worked in a Turkish company as a programmer, he learned the language quickly and was often consulted by his friends to help him with translation.

'Many of my friends used to call me frequently: "Please can you translate, I'm in a bank, I'm in furniture store", etcetera', he recalls. 'So, we started to develop the app Tarjemly Live, which means "translate for me" in Arabic.'

The Tarjemly Live app connects Syrians with translators and interpreters, who are often Syrian refugees themselves with more advanced Turkish language skills. In this way, Namaa Solutions is generating jobs for other Syrian refugees in Turkey, and for Turkish people with Arabic language skills. The translation and interpreting work is done either through calls or texts. Online usage statistics show that 77 freelance interpreters translated more than 37,000 words for 17,000 minutes during the first year of operation.

Moujahed's innovative spirit has not waned. New projects planned include a learning management system and interactive learning content for Syrian refugees. Another project is buy4impact.com, a trading platform that helps Syrians to sell hand-crafted products to an international market.

Trauma and identity struggles

Scope of the challenge and educational implications

Challenges related to the overall psychosocial well-being of refugees are quite complex and individually nuanced. As many studies confirm, refugees have reduced levels of well-being and a high prevalence of mental distress due to past and ongoing trauma (Bradby et al., 2015, p. 6; Porter and Haslam, 2005). Groups that are particularly affected and whose needs often remain unmet are women, older people (Porter and Haslam, 2005) and unaccompanied minors (Bradby et al., 2015). Furthermore, a needs assessment conducted in the Zaatari refugee camp in Jordan in 2015 noted that males between the ages of 12 and 17 are among the most vulnerable groups, because of the need to support their families, whereas donors often choose to focus their interventions on females (Education Sector Working Group, 2014). In addition to experiencing mental health problems from traumatic experiences, refugees are further affected by identity struggles, which are common in persons who are uprooted and detached from their social and cultural home environments and who need to reconstruct and renegotiate identity and belonging in their new host countries (Colic-Peisker and Walker, 2003; Valentine et al., 2009; Warriner, 2007).

Psychosocial well-being can be related to learning and education in two ways. First, there is evidence that refugees' experience of war and conflict directly and negatively impacts their education and academic performance. For example, a high prevalence of academic problems and behavioral difficulties has been identified in war-affected refugee children (Betancourt et al., 2012), and refugees' emotional problems have been associated with learning difficulties and lower levels of academic achievement (Rousseau et al., 1996). Second, participation in school and specific education interventions can improve psychosocial well-being. While this relationship has been broadly researched in the USA, little is known from humanitarian contexts (Burde et al., 2015, p. 57).

Post-traumatic stress and depression are very common in refugee populations and tend to affect their educational success.

The factors that contribute to poor mental health are multifaceted. They include traumatic incidents that trigger flight, such as violence experienced during a war; disruption and separation of families; or a long and dangerous trek; as well as living conditions in camps (Hannides et al., 2016, p. 36). Children are particularly affected, as a study in the Islahiye camp in Turkey found: 79 per cent had experienced death

in the family, 60 per cent had witnessed someone being physically hurt and 30 per cent were directly affected by physical violence. This resulted in 45 per cent of children showing symptoms of post-traumatic stress disorder and 44 per cent exhibiting indicators of depression (Sirin and Rogers-Sirin, 2015, p. 1). A similar pattern was also observed in adult refugee populations: in Tanzanian camps, a prevalence of mental health problems was found in around 50 per cent of Rwandan refugees (de Jong et al., 2000).

Identity struggles present more subtle yet profound challenges because they affect the very nature and sense of one's self. Being forced to move away from friends, family, community and country often means the loss of refugees' most fundamental anchoring points for their identity and sense of belonging.

Identity struggles and acculturation stress are subtle but very profound challenges affecting uprooted refugees who need to reconstruct identity and belonging.

Although refugees do not stop identifying with the countries they left, they cannot claim the latter to be the guardian of their national identity (Waters and LeBlanc, 2005, p. 144). In addition to grappling with shifting identification with their original nation and culture, refugees also struggle with the effort to adjust to a new cultural setting. Although acculturation, as a process of assimilation and integration, is often seen as a goal, it is associated with mental health problems, unhealthy behaviours, health disparities, depression, suicidal ideation, eating disorders and other mental and physical health disorders (Bacigalupe and Cámara, 2012, p. 1429). Although it is important for refugee children to gain a sense of belonging from schools, it has been argued that educational environments in host settings tend to present exclusive national and cultural identities, such as in history classes (Dryden-Peterson, 2015a). In camps setting as well, the educational design can restrict identity construction processes, such as through the prioritization of basic literacy and numeracy skills over history, science, religion, music and art (Waters and LeBlanc, 2005, pp. 137–38).

Assumptions and evidence base

Although addressing trauma and identity struggles is not at the core of many mobile learning and refugee projects, the way that digital technologies are designed and used reveals underlying and more explicit assumptions about the potential impact of these technologies on refugees' well-being and mental health.

Clearly, the use of digital technology and mobile solutions cannot fully replace intensive and specialized face-to-face

care in severe trauma cases in crisis and refugee contexts. However, a few mobile approaches have been tied to the enhancement of refugees' well-being, either as an outcome alongside other explicit learning outcomes, or as the primary objective. Reflecting the first scenario, significantly positive psychological effects were associated with the deployment of a mobile mathematics learning project in a social learning setting, measured through a quantitative design. In an example of the second scenario, a qualitative investigation indicated positive effects resulting from the use of digital media and other tools in specific workshops and activities within a safe environment. However, the evidence found in these two domains is thin and requires further investigation. A third approach, which has not been evaluated yet, is the integration of psychosocial principles directly in the technical and didactic design of mobile learning apps.

With regard to identity (re)construction, there is some qualitative evidence that proposes storytelling as a valuable tool. However, this body of knowledge also needs to be corroborated with further research studies.

The following sections will show the extent to which mobile learning solutions can contribute to improving refugees' well-being, especially with regard to post-traumatic stress, and how they can support the processes of identity (re) construction.

Current practices and projects

Addressing well-being and post-traumatic stress

Several mobile learning programmes consider and measure psychosocial well-being, and some have been identified as having a positive impact in crisis contexts. Some gains have been reported from the implementation of mobile learning projects in non-formal learning settings. The evaluation of the project **E-learning Sudan** (see also section 4.1.3.2), in which out-of-school children played a mathematics game for a period of six months, found significantly increased levels of children's self-esteem, but no improvements in self-efficacy, motivation and future orientation. As a result of participation in the project, children developed a better image about themselves, either through their mathematical gains or through other factors associated with the pilot, such as the social aspects of learning together, visits to the community by others or the use of ICT. Both self-esteem and self-efficacy were found to have a significant positive effect on learning outcomes (Stubbé, van der Klauw et al., 2016, p. 3).

Explicit measures for psychosocial healing in education and community centres of affected refugee populations can also be enhanced by mobile technologies. For example, a report compiled using qualitative methods found that strengthening resilience and control of post-traumatic disorders was considered one of the main outcomes of **Ideas Boxes**,

portable and customizable multimedia centres with multiple digital/mobile and non-digital educational and information resources. The provision of a safe and recreational space within the insecure situations of Burundian refugee camps alone was deemed an added value. In addition, facilitated activities such as writing workshops and the use of creative tools for multimedia productions were found to support traumatized refugees by acknowledging the trauma and translating it into images to help rebuild a positive self-image (Lachal, 2015).

Some learning apps anchor psychosocial elements directly in their design. This has been explicitly required for the apps developed in the context of the EduApp4Syria competition (Norad, n.d.; Wang, 2017). The apps are not conceived as a treatment for mental illness but are rather intended to be a means to enhance well-being among the players. According to the evaluators, this can be achieved through apps with high levels of adaptability. The tasks have to be adaptively aligned with the increasing skills of the learners to facilitate the experience of success and enhance players' self-esteem. While players have to be challenged and motivated to help develop their resilience, they should not be overburdened, in order to avoid any experience of failure and frustration. Balancing between these poles is a general game design principle, but it can be deemed particularly relevant in refugee contexts with vulnerable users. Another aspect of these games is that the players are tasked with caring for figures and characters (Bisignani, 2017). For example, in **Antura and the Letters** players need to care for the pet dog (All Children Reading, n.d.*a*; Neumann, n.d.), while in **SIMA** they need to interact with and care for game characters from different cultural backgrounds or characters living with a disability (Bisignani, 2017).

> *Mobile learning programmes can incorporate and facilitate social and emotional learning – and mobile technology can also serve as a means to track refugees' psychosocial status – but very little is known to date.*

Digital and mobile solutions have been used more systematically and explicitly to track psychosocial states. A study with 900 combatants and veterans in conflict-ridden Burundi has piloted a novel way of deploying mobile technology to assist the assessment of mental health, as a prerequisite for prevention and intervention measures. A tablet-based survey guided paramedics in carrying out semi-structured clinical interviews to assess trauma-related syndromes in need of treatment. The findings not only identified a prevalence of serious traumatic stressors but also underpinned the feasibility of mobile assessments of clinical symptoms in mental health assessment and screenings (Crombach et al., 2013).

Stimulating identity development processes

Refugees who are detached from their social and cultural homeland lose the most profound anchoring points of their identities. In the framework of acculturation processes in new environments, many struggle with the question of who they are and where they belong. Naturally, such profound issues cannot be resolved by any mobile technology quick fixes. However, digital and mobile storytelling has been quite helpful for refugees as a means to promote reflection on identity and sense of belonging.

Digital storytelling embraces the use of technology to create multimodal stories individually and collectively with text, photographs, sound and/or video. The following projects show that storytelling is used in diverse settings, ranging from camp environments to resettlement and integration contexts.

In camps hosting Palestinian refugees in the West Bank and East Jerusalem, a digital storytelling project was carried out with marginalized youth. The **Voices Beyond Walls** programme featured a series of ten-day workshops in which groups of twenty to twenty-five youth between the ages of 10 and 16 were guided in the production of short video clips by volunteer teams made up of Palestinian and international educators, activists and media specialists. They integrated original stories, drama, poetry, photography, music and digital video, expressing their own perspectives on Palestinian history, culture and everyday camp life, as well as their dreams and aspirations. A qualitative evaluation found that the creative engagement triggered shared satisfaction and identity, as well as recognition among peers, family and the community, especially for young women and younger, disaffected participants. However, successful implementation must address an array of challenges such as developing training and support measures for the facilitators, balancing the collaboration of diverse age groups, and dealing carefully with often hidden psychological trauma (Sawhney, 2009).

Digital storytelling can foster creativity and participatory/collaborative cultures, and can help refugees explore and express their identities.

The research project **CHICAM** emphasized the meaning of digital media production for personal expression and identity (re)creation among excluded European refugee and migrant children from across the world. Through media clubs in several European countries, children between 12 and 14 years of age were facilitated in a wide range of media production activities addressing topics such as friendship, school, home and belonging. The activities included the production of fiction, plays portraying peer-relations, real-life stories in documentary format, performances where children acted in front of the camera demonstrating movements and gestures,

photo collage videos to conceptualize their past, and hand-drawn animated movies. This allowed children to rework refugee experiences that are difficult to express through other means. Results of this ethnographic study indicate that, although technology was an obstacle and children sought spaces with no structured education at the beginning, they became increasingly interested in expressing themselves openly. The productions allowed the children to not only address potential sources of tension between their culture of origin and their host setting, but also express views on future lives and define enabling conditions in playful ways (de Leeuw and Rydin, 2007).

While the projects cited above rely on relatively advanced technological equipment, noteworthy results have also been achieved using a simple, mobile social media-based storytelling approach that was implemented through a series of workshops with young, second-generation immigrants at risk of social exclusion in Italy (Ranieri and Bruni, 2013). The creation process required each participant to write a text message with a piece of a story on a shared mobile phone, publish it to Facebook and hand the phone to the next participant. The staggered, real-time writing process aimed at stimulating attention, creating narrative coherence and minimizing resistance to writing. Creating activities that did not adopt traditional learning methodologies allowed participants to stay motivated and engaged. In the next step, the mobile phone was used to videorecord one of the co-created stories, simulating the work of an authentic movie production. Some participants showed initial anxiety over showcasing photos or videos on their profiles, as if it was a threat to their online reputation. However, over time all participants became more comfortable with their self-images. This qualitative action research concluded that mobile storytelling is a favourable means of fostering creativity, a participatory and collaborative culture and, importantly, the exploration and expression of identities for marginalized groups, 'turning silence into play and discovery' (Ranieri and Bruni, 2013, p. 233). However, this method is certainly no panacea, as the stories, which were marked by laconicism and misspellings, accentuate linguistic shortcomings and have the potential to reinforce pre-existing divisions (Ranieri and Bruni, 2013).

Reflections and emerging practice

The preceding section has identified different approaches that show some potential to enhance refugees' well-being. Despite its relevance to refugee learners, the design of mobile applications and programmes to support mental health and trauma therapy pertains to the domain of health and arguably goes beyond classic education domains. Nevertheless, the potential of mobile learning apps and programmes to support not only knowledge and skills acquisition but also enhance refugees' psychological well-being, has broad relevance for all

educators working with refugees. However, the scarce body of evidence that associates mobile learning with refugees' well-being needs to be corroborated by further analyses. The research community also needs to better understand how mobile learning can help improve well-being – that is, by identifying specific measures and design principles that cause psychological impact, so that these can be replicated and considered in the development of refugee learning apps more consistently. Another gap that needs to be addressed is knowledge about the potential impact of mobile learning on adults' well-being, because most of the projects identified target children and youth.

The potential of digital storytelling to support refugee children's need for personal expression and identity (re) creation has been confirmed by a limited number of qualitative, ethnographic research studies. The findings also connect to the conclusions of a broader review on digital storytelling in mental health (De Vecchi et al., 2016). This review emphasizes that despite the dearth of studies available to date, the importance of digital storytelling to enable learning, as well as promote mutual understanding and empathy towards lived experiences across a range of areas in mental health care, cannot be underestimated. Digital storytelling techniques may be particularly relevant in refugee and other low-resource contexts because they can be carried out on basic devices, reducing technical access barriers.

A recurring topic is the importance of differentiating storytelling activities from the typically narrow structures of academic activities, allowing for informal and exploratory learning activities and spaces. However, this does not mean neglecting the role of guidance and facilitation, which are key to success. In this sense, harnessing the potential of storytelling requires thorough preparation and comprehensive support, and the intensity of engagement has been described as exhausting. A relevant ethical issue is how to carefully balance the tension between the facilitation of personal expression and the protection of confidentiality and non-exploitation of vulnerable target groups (De Vecchi et al., 2016).

Disorientation in new environments

Scope of the challenge and educational implications

Refugees need to adjust to new and changing environments, especially before or during transition and upon arrival. As Moser-Mercer (2015, p. 2) explains, people in fragile contexts such as refugee camps 'must contend with highly flexible practices and chaos in order to cobble together a viable way of being'. These conditions trigger constant informal learning

and problem-solving and create a demand for updated and situation-specific information.

The deficit of reliable and timely information before and during the journey puts refugees at great and unnecessary risk.

During crises and in escape situations there is a scarcity of trustworthy and timely information, which refugees need to navigate through insecure and unstable environments marked by high levels of misinformation. For example, a key challenge voiced by refugees from Syria, Afghanistan and Iraq during their journey to Europe was confirming whether certain border crossings were open or closed (Hannides et al., 2016, p. 5).

Individuals often resort to unreliable social network channels before, during and after their journey, and can thereby be exposed to the risk of being exploited by smugglers and other criminals (Gillespie et al., 2016, pp. 5–6). Access to credible information sources is especially critical for women and children, who are particularly vulnerable in regard to health and safety (Gillespie et al., 2016, p. 11). During the journey, access to reliable information can make the difference between life and death, such as in boat situations (Gillespie et al., 2016, pp. 11–12).

In provisional camp environments and during asylum and immigration processes, refugees must orient themselves in completely new environments. Also in these settings, refugees are concerned about the credibility of information they receive, as emerged from a study in the Zaatari refugee camp in Jordan (Wall et al., 2017). The period following the arrival in a new environment, and especially the first weeks, is particularly challenging for refugees. For example, a lack of clarity about rights, status and administrative processes caused frustration and distress in Greek camp settings (Hannides et al., 2016, p. 17). In the USA, refugees were reported to face the most significant obstacles immediately after their arrival in the country. Complications arose from simple tasks because of the fundamental differences in systems and infrastructure between home and host settings (Baranoff et al., 2015, p. 9). Difficulties in understanding the rules governing interactions with host institutions and the routines for accomplishing tasks, as well as their limited language skills, can all make problem-solving harder for refugees (Walker et al., 2015, p. 332). In the literature, the refugees' need to acquire broader cultural knowledge of national and local procedures, customs and facilities is consistently emphasized (Ager and Strang, 2008, p. 182). This need can include a largely unmet demand for the provision of systematic information regarding housing, shelter, clothing, regulations, administrative (asylum) processes, health issues and transportation systems. For example, Syrian and Iraqi refugees in France emphasize their need to access information

about services and organizations available to them more easily and quickly (Gillespie et al., 2016, p. 12).

Lack of systematic support and information provision in new and changing host environments creates feelings of disorientation and helplessness.

Despite these demands, limited systematic information has been made available through official channels, especially in digital formats. Camps and other host areas, for instance, often do not have sufficient relevant-language applications or other online sites to communicate important laws, permits and other information to their refugee populations (Lepeska, 2016). In Europe, inadequate information is provided to refugees, and a pan-European information-sharing approach is clearly lacking (Gillespie et al., 2016, p. 2). The situation is further exacerbated because refugees are often suspicious of official and state bodies. As a matter of fact, in their home countries, governments are often the main sources of repression and persecution, and even United Nations officials are often believed to be linked with government officials (Hannides et al., 2016, p. 16). Moreover, refugees can develop distrust during their journeys because information received from different sources may fail to meet their expectations (Hannides et al., 2016, pp. 16, 24).

The sum of these obstacles compounds the issues that refugees face when moving through and settling in new environments. Therefore, there is a need to explore how various mobile learning initiatives have contributed to mitigating the negative impact of experiences of disorientation.

Assumptions and evidence base

In the media, and especially on social media, refugees' use of mobile technology is the subject of highly controversial debates. Voices in tabloids and on social media frequently question the legitimacy of refugees' search for support because there is the perception that people fleeing conflict have to be poor and cannot carry 'costly' smartphones. Other media reports, instead, emphasize the essential role that mobile phones play in supporting refugees in insecure and new environments during displacement and flight (Dubinsky, 2015; O'Malley, 2015).

The current evidence base, which is comprised of qualitative studies, confirms the relevance of mobile technologies as the key resource for information gathering and problem-solving in situ, as well as for informal learning, in and across many new and changing contexts before, during and after flight.

Mobile instant messaging and mobile social media spaces are particularly useful for refugees. However, the benefits

of these tools only materialize for some refugees, especially those who have been dislocated in the context of the Syrian crisis. Other refugees who were poorly connected before their escape benefit to a much lesser extent by comparison (Hannides et al., 2016). The key success factor that cuts across contexts is the development of trust among users, as refugee populations have good reasons to question any information provided by public and informal sources. Given the importance of developing a sense of trust for mobile learning offerings among refugees, the next section will share insights about how some projects and initiatives have attempted to build this trust.

Current practices and projects

Orientation before and during escape

In the insecure and unstable situations of crisis and especially during escape, refugees' safety, and sometimes survival, very much depends on trustworthy and timely information, for instance for planning secure routes. To satisfy these basic informational needs, refugees have resorted to the creative and flexible use of mobile phones, which are harnessed for a set of functions including SMS, calling, maps, instant messaging (such as Viber, Facebook Messenger and WhatsApp) and social media. A variety of channels is necessary for responding to the changing infrastructural and regulatory conditions encountered by refugees as they move from one country to another, such as varying connectivity, internet access, access to power and mobile phone bans in detention centres.

Informal mobile communication can serve as the main information reservoir for refugees planning their flight route. Refugees source information by communicating with others who left before, to follow their paths and learn from their experiences (Gillespie et al., 2016, p. 48; Hannides et al., 2016, p. 23). Mirroring this observation, refugees see instant messaging tools, such as WhatsApp, as a means to 'demystify' the journey (e.g. Manjoo, 2016).

During their journey, mobile phones are refugees' lifeline, helping them solve problems as they navigate through unfamiliar and insecure geographical and linguistic terrain.

Mobile technologies also facilitate the sharing of image-based information relevant to flight. Figure 4 shows a map entitled 'The Road to Germany' in Arabic with a route from Izmir in Turkey to Germany by land, sea, rail and foot that has been widely circulated among Syrian refugees via WhatsApp. The information in this map is meticulously geared towards refugees' information demands during their journey. The map includes more than just information about costs in the

respective currencies and the diverse means of transport. For example, the names of locations along the route are transcribed in such a way to ensure that Arabic speakers will pronounce them correctly. The high level of demand-oriented details suggest both iterative and collaborative, and digital and non-digital, cycles of production (Gillespie et al., 2016, pp. 47–48).

Figure 4. 'The Road to Germany' map circulated on WhatsApp among refugees
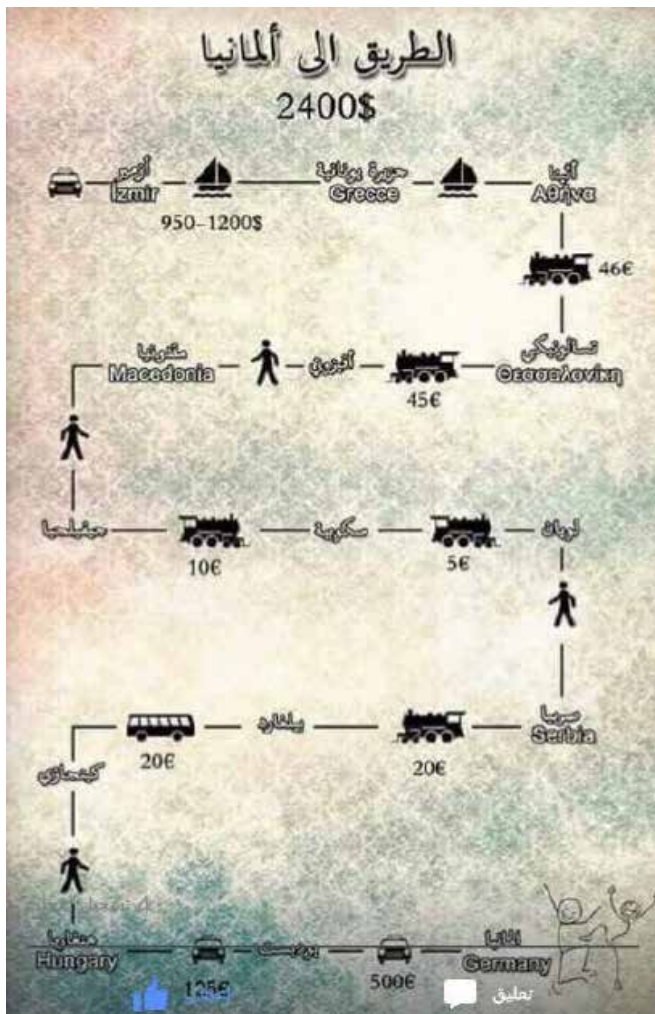
Source: The origin of this digital image is unknown. It has been relayed many times on WhatsApp. The image is featured in the research report *Mapping Refugee Media Journeys: Smartphones and Social Media Networks* (Gillespie et al., 2016) published by the Open University, which has authorized UNESCO to reproduce the file in this publication.

During the journey, mobile phones are essentially the refugees' lifeline, enabling them to navigate through unknown geographical and linguistic terrain by using online and offline apps such as MAPS.ME (Rutkin, 2016) and digital translation aids (see section 2.1.3.3). Location functions are invaluable in dangerous situations, such as during boat trips, because they present the only means of getting in touch with the coastguard or relatives to organize help, as the following narration from a Syrian refugee impressively demonstrates:

'We were in the rubber boat, all the phones were in bags, he was the only one not to put his phone in a bag so he could stay in touch with coastguards and send the location to his brother in the Netherlands. Each two minutes, he used to tell him where we were.' (Gillespie et al., 2016, p. 46)

Essentially, information that refugees receive via mobile and social media channels helps to keep them safe during the trip. However, this advantage is often not available to refugees with poor online connections before they left home, such as refugees from Afghanistan (Hannides et al., 2016) or refugees who cannot easily access the internet for a variety of reasons.

Beyond informal personal communication, the **Alarmphone** project offers broader and systematic support. Composed of activist networks from Europe and Northern Africa, the project set up a self-organized hotline for refugees in distress in the Mediterranean Sea. While it is not a rescue number to replace coastguard services, it acts as an instrument to increase immediate pressure on rescue attempts and seeks to counter pushbacks and other human rights violations at sea (Alarmphone, n.d.). There are also specific apps that systematically support refugees' geographical trajectories, such as the Hungarian app **InfoAid** (InfoAid, n.d.), which provides transport information and updates on border-crossing opportunities to counteract the existing misinformation (Kozyra, 2016).

Orientation upon arrival and in resettlement

Mobile devices can be helpful not just before and during flight but also once refugees have arrived in their host countries. Upon provisional or definite arrival, and especially in the first weeks, refugees struggle to orient themselves to completely new environments. In these situations, the mobile phone can play a key role by supporting refugees in their informal learning and problem-solving processes. The large number of apps found on refugees' smartphones, such as apps for language learning, news, media and translation, is indicative of the centrality of phones in refugees' lives upon arrival in Europe (Kutscher and Kreß, 2016, p. 201).

The Syrian crisis has given rise to a proliferation of apps and programs available to satisfy refugees' informational demands upon arrival – but only a few of them are used at scale.

One approach to supporting refugees' information-seeking processes is the creation and development of apps and online/mobile information portals. The Syrian crisis has sparked the development of numerous refugee apps, ranging from general catch-all apps to specific apps that focus on distinct domains such as accommodation, health or authorities. A comprehensive analysis of the sheer volume

of new and emerging initiatives and applications would go well beyond the scope of this report. In fact, this dynamic has given rise to the development of meta-apps and meta-platforms with the sole purpose of providing an overview of the existing resources, such as Apps for Refugees and Refugee Projects. The purpose of this section is thus to provide an overview, including the portrayal of selected projects, programs and apps, which is then broadly assessed against the informational and educational needs identified.

The provision of apps that support refugees' orientation in their new environment is common. A remarkable example of a general, 'one-stop shop' app is **Gherbtna**, which seeks to support Syrian refugees in the provision of information to build new lives in Turkey. The scope is broad, covering legal, administrative, employment, banking, medical and dining information and more (see case study in section 2.1.3.3). The app has been downloaded about 50,000 times, which is roughly equivalent to 5 per cent of the Syrians living in Turkey (Lepeska, 2016). A similar app that was recently launched in Turkey is **Alfanus** ('lantern' in Arabic) (Lepeska, 2016). Another example is the app **Bureaucrazy**, which seeks to help refugees as well as ordinary citizens in Germany deal with administrative procedures (Oltermann, 2016). The interesting aspect of these three examples (and many others) is that they have all been developed by refugees.

SMS systems represent another technological means to provide refugees with information regarding resettlement and integration. SMS platforms are simple and can reach users on basic phones and in areas without internet coverage. Unsurprisingly, SMS technologies have been used in humanitarian situations and in areas with limited technological infrastructure. For example, in camp settings in rural Lebanon, refugees stressed the importance of mobile phones for receiving SMS-based aid information from UNHCR about food vouchers, diesel for heating and blankets (Talhouk et al., 2016, p. 337).

> *SMS platforms are often the only means to inform refugees in low-resource contexts. They are, however, no silver bullet with indefinite scalability, but rather require trust-building on the ground.*

An interesting lesson was learned in the **ASCEND** project from UNHCR Innovation and Stanford University, which piloted the use of a mass-message solution with refugee communities in urban Costa Rica. The challenge of the project, which provided refugees with education about their rights and opportunities, was the development of trust, especially in situations in which refugees were confused by messages from the system's unknown number. Accordingly, awareness and trust-building in close cooperation with a local partner turned out to be a key success factor (UNHCR Innovation, n.d.*a*).

Refugees tend to use their mobile devices and mobile social media to address informational and educational needs after their flight in relatively informal and unstructured ways. Studies from different contexts have documented how refugees use digital tools for manifold practical and instrumental tasks among themselves as well as with third parties in day-to-day situations or in emergencies. For example, a study on Syrian refugees in rural Lebanese camps describes women maintaining WhatsApp groups to coordinate issues such as transport with their neighbours (Talhouk et al., 2016, p. 336). Refugees are reported to use their phones to connect with local volunteers, for example via Facebook groups (Ritscher, 2016), for all sorts of practical guidance (Gillespie et al., 2016, p. 50). Also in integration contexts, as in flight settings, mobile technology plays an essential role in obtaining assistance in emergencies, including access to medical or police services (Bacishoga and Johnston, 2013; Walker et al., 2015, p. 331).

> *Particularly in the context of the Syrian crisis, refugees have adopted informal mobile and social-media-based channels to obtain and share critical practical and instrumental advice at a large scale in their new environments.*

In contrast to many refugee-specific apps, social media have been widely adopted in the settings of the Syrian refugee crisis. Reports say, for example, that Syrians in Turkey access Facebook to obtain information on all types of integration issues, ranging from administration, jobs and housing to dining and events (Lepeska, 2016).

Reflections and emerging practice

A mobile phone is the key instrument for many refugees for their orientation to new, often confusing and sometimes insecure environments during and after their journey. Although the gathering of information for problem-solving is far from education in formal settings, it mirrors popular approaches that conceive 'the processes of coming to know and being able to operate successfully in, and across, new and ever-changing contexts and learning spaces' to be at the core of mobile learning (Pachler et al., 2010).

From a practical standpoint, refugees' digital and mobile orientation processes are inhibited by a number of dynamics. These include the lack of systematic digital information from official institutions and refugees' distrust in these institutions, high levels of misinformation in mobile social media spaces, and unequal access of groups of refugees to smartphone or internet-based resources.

The lack of systematic information from official institutions, and refugees' distrust in these bodies, have resulted in the emergence of digital parallel worlds in social media and mobile instant messaging spaces in which a plethora

of stakeholders, ranging from refugees, smugglers and volunteers to family and friends back home, create and share information. For refugees who fear persecution for themselves and their families, private and 'safe' spaces are key (Wall et al., 2017). However, although the on-demand information exchange in these spaces seems to cater to the informational needs of refugees in terms of flexibility, it is prone to misinformation and lack of security.

Specific apps for refugees are emerging with the purpose of counteracting the lack of systematic and trustworthy information, especially for refugees in (mostly European) resettlement contexts. Nevertheless, the majority of these apps are far from reaching the scale of the more informal mobile and social media spaces. One of the key challenges is to find ways of transforming the often provisional support into more sustainable solutions, as the curation of digital and mobile portals and apps requires considerable resources and needs robust funding models in the long term.

To address these issues, it is not only relevant to develop and sustain information platforms but also to reach groups of refugees and gain their trust. To this end, the use of social media spaces could be an interesting means for disseminating general information as well as promoting more formal educational messages or advertising courses to refugees who could not be reached by more traditional marketing means. To increase the reach and engage in user dialogue, existing or new apps and online platforms should be complemented by social media or instant messaging media (as the app Gherbtna does successfully, see section 2.3.3.2). The promotion of information and educational opportunities could also be achieved by collaborating with people with a well-developed social media reputation from within refugee communities. An example is that of a well-known YouTube personality in the Arabic-speaking community who was convinced to feature a learning platform in one of his clips (Welt, 2015).

Most existing apps, platforms and mobile social media programmes rely on internet connectivity and on the availability of advanced phones and power. However, smartphones are out of reach for many refugees, and the internet is often not accessible for them, especially in rural areas (UNHCR, 2016a). In addition, even refugees who own smartphones and have internet access are often not using the full range of available applications and functionalities. For example, it has been argued that even in the framework of the Syrian refugee crisis, which has mobilized unprecedented groups of highly educated and technologically well-equipped refugees, it is not the targeted apps or classic social media that are most popular, but rather much simpler instant messaging applications such as WhatsApp, Viber and Facebook Messenger (Rutkin, 2016). Arguably, one approach could be to support refugees in better leveraging the functionalities of their smartphones, and especially in accessing secure and private mobile communication spaces.

In addition, and to avoid discriminating against refugees without smartphones or internet access, multichannel information approaches in many contexts require the provision of SMS-based solutions. Although the examples in this report clearly point to the feasibility of texting as a means for information and education provision in refugee contexts, SMS is not a 'shotgun approach' with indefinite scalability options; rather it requires intensive work on the ground and close collaboration with local stakeholders and NGOs to ensure the development of trust among users.

Exclusion and isolation

Scope of the challenge and educational implications

Feelings of isolation and exclusion are a key challenge that refugees face when they move to a new environment, as research on Syrian refugee children exemplifies (Sirin and Rogers-Sirin, 2015, p. 2). Felt and lived experiences of loneliness not only impact refugee learners' success in formal education but also deprive them of the much-needed networks and communities that facilitate informal learning and knowledge exchange. In refugee populations, isolation can play out in two central ways. Firstly, many refugees are separated from families and friends who live in diasporic settings or back home. Secondly, feelings of isolation and exclusion are further aggravated by a lack of interaction with people in the mainstream culture of the host environment, particularly if refugees reside in camps in isolated parts of the host country.

Isolation from close ties causes loneliness and negatively affects education, especially for children who are deprived of parental support.

Suffering from the separation of close ties and wider communities is a common phenomenon among refugees and displaced persons that negatively affects their well-being and education. In contrast to clear-cut losses such as death, the uncertainty of an 'ambiguous' loss can be associated with relentless stress, depression, guilt and anxiety (Bacigalupe and Cámara, 2012, p. 1428). Children who are separated from one parent or who are completely unaccompanied are particularly vulnerable. According to a qualitative study from Canada, the separation of African high school refugees from family results in not only acute loneliness but also a lack of instrumental support usually provided by parents: 'My father used to help me with schoolwork' (Kanu, 2008, p. 923). A systematic review of educational needs and barriers for refugee students in the USA observed parental involvement in children's education as

an important influencing factor on students' success (McBrien, 2005, p. 345).

Refugees' detachment from mainstream host cultures is another key problem.

In addition to the separation of refugees from their home communities, connecting with people from the mainstream culture in host settings is also challenging. Detachment affects refugees' daily lives and particularly their school environments. Refugee children's experience of school-based education is often characterized by isolation and exclusion, which is in turn significantly associated with learning difficulties in some refugee cohorts (Rousseau et al., 1996, p. 245). Compared to camp settings, refugee children in urban areas have less support in accessing psychosocial services and in addressing discrimination, harassment and bullying from teachers and peers (Dryden-Peterson, 2011, p. 44). Syrian refugee parents fear sending their children to schools due to physical and emotional bullying (Dryden-Peterson, 2015a; UNICEF and Save the Children, 2012, p. 5). Bullying and exclusion in schools is also in evidence in high income countries such as the UK or the USA (Ager and Strang, 2008, p. 172; McBrien, 2005, p. 352). For example, Somali youth in the USA reported receiving negative treatment and taunts from peers for their head coverings and limited English language skills (Birman et al., 2002, p. 7).

Refugee children's school experience is often marked by isolation and exclusion, which go hand in hand with academic problems.

Another vulnerable group are women. While children attend schools and men tend to work, women often stay at home and have significantly fewer chances to interact with people from the host setting. In Australia, this was found to lead to women's isolation from the broader community and a longer time needed to adjust to local life (Ahmad et al., 2015, p. 39). In contrast to the rich social lives that some refugee women experience in their home countries, the limited opportunities to engage with neighbours and the wider community create a deep sense of loneliness (Walker et al., 2015, p. 331). In the UK as well, the stark contrast between the close social family ties in their original cultures and the feelings of isolation refugees experienced in the new settings was felt to be depressing (Ager and Strang, 2008, p. 183).

It is therefore necessary to understand how exclusion and isolation intertwine with mobile learning to create connections that support refugee integration.

Assumptions and evidence base

The belief that mobile solutions can help address refugees' need to stay in touch with their loved ones is reflected in projects and initiatives that distribute phones or SIM cards to refugees in diverse settings, ranging from European to African contexts.

Studies analysed for this report have yielded strong qualitative evidence confirming mobile media as the key and often the only resource for refugees to maintain and develop their social networks with friends, colleagues and family members back home or in diasporic settings. In this sense, the use of mobile media is crucial in the absence of other options. Further qualitative evidence positions mobile media as an important resource to support the process of building new social ties in host country environments. The development of social networks with home and host communities helps refugees and immigrants alleviate isolation and loneliness, and one qualitative investigation links refugees' connectedness with their ability to exhibit higher levels of resilience. Developing and maintaining these networks also carries considerable learning potential from participatory and connectivist viewpoints.

It was not possible to find evidence proving that mobile media use results in the better integration of refugees into the mainstream cultures of their new host country settings. However, studies suggest that the use of digital communication tools can aid the integration process, and examples of how this integration occurs are shared in the next section.

Current practices and projects

Connecting with diasporic communities around the globe

Communication with friends and family is of paramount importance to refugees. A considerable number of studies confirm that mobile technology is key in meeting this demand. (See, for example, Almohamed and Vyas, 2016; Cuban, 2014; Gillespie et al., 2016; Hannides et al., 2016; Khoury, 2015; Kutscher and Kreß, 2016, p. 201; Leung, 2011; Talhouk et al., 2016; UNHCR, 2016a; Walker et al., 2015; Wall et al., 2017; and Xu and Maitland, 2015).

Refugees and migrants create mobile learning networks with their transnational families and friends. These are immensely important as a source for sharing tacit knowledge and stimulating feelings of proximity and mutual awareness.

In response to varying technological and structural conditions, refugees flexibly use different phone functions

to connect with family, friends and colleagues during their flight (Gillespie et al., 2016, p. 48), in camps and shelters (e.g. Leung, 2011; Talhouk et al., 2016, p. 336; Wall et al., 2017), and in resettlement processes (Hannides et al., 2016; Kutscher and Kreß, 2016, p. 201; Leung, 2011). Feelings of proximity and mutual awareness are stimulated across transnational social networks by multimodal exchanges (e.g. sharing pictures) and ritualized communicative micropractices, that is, the exchange of small messages across longer periods of time (Cuban, 2014, p. 743; Thompson, 2009). The effects are perceived to be beneficial in almost all of the studies. A larger analysis of Syrian, Afghan and Iraqi refugees in their transition towards and into Europe concluded that refugees who maintain communication networks with other refugees, family and friends via mobile and social media channels are likely to be more resilient than refugees with lower levels of connectivity (Hannides et al., 2016, p. 4). The development of these digital social networks is also beneficial from a learning perspective. Transnational and dispersed families form mobile learning communities and share unofficial or tacit knowledge and information (Cuban, 2014, p. 747). In this sense, the appropriation of these resources could be conceived as a source of social capital (Bacigalupe and Cámara, 2012, p. 1431). While the subtle processes of connecting with and becoming a member of a globally dispersed community can be conceived as learning in its own right, more explicit forms of learning and instruction, such as language learning, were also observed as part of these processes (Cuban, 2014, p. 748).

Recognizing the potential of mobile media in helping refugees connect with their loved ones back home and elsewhere, some initiatives are distributing phones and/or SIM cards to refugees. For example, a project to distribute free SIM cards preloaded with a small amount of credit to refugees in a camp in Rwanda was launched. SIM cards with credit were important because Burundian refugees could not use their phones for many reasons, including a lack of airtime and the absence of a stable power supply. To respond to this second challenge, a small mobile solar kiosk was built so that people could charge their devices (ICRC, 2015). While initiatives of this kind can be beneficial for refugees in the short term, further attention should be given to the sustainability of the projects, including considerations of the need for refugees to top up their credit once it runs out or to register a SIM card in those countries where such registration is mandatory.

Connecting with host settings

It is important for refugees to connect with the diaspora and other refugees like themselves as well as members of the host country community. Mobile phones are a central resource to connect with the same or similar ethnic groups and with mainstream cultures in new host environments (Bacishoga and Johnston, 2013; Chib and Aricat, 2016, pp. 7-8; Hunter, 2015; Kim et al., 2013; Liamputtong et al., 2015; Walker et

al., 2015). For example, one qualitative study showed that bonding enacted through mobile phones helped South African refugees overcome isolation and feel more accepted, safe and confident (Bacishoga and Johnston, 2013, p. 9). The connectivist and participatory affordances of mobile phones provide refugees and displaced people with the opportunity to become more central members of their respective local communities, as a study on illegal immigrants in Zimbabwe shows (Kim et al., 2013, p. 153). Similarly, a qualitative study in Singapore emphasizes the role of mobile phones as participatory platforms for learning and growth that facilitate cultural diversity of transnational migrants. However, this phenomenon was much more pronounced in work settings than in private spheres, making work a key vehicle for integration, with mobile phones acting as a means to support the process (Chib and Aricat, 2016).

While mobile phones are key in helping refugees and immigrants connect with similar ethnic groups in their new host environments, they do not automatically facilitate their inclusion in the mainstream culture.

In addition to the myriad informal processes, **formal refugee peer support programmes** aim to strengthen refugees' inclusion and connectedness in host settings. A project in Australia facilitated peer-to-peer networks of refugee women from Afghanistan, Burma and Sudan who live dispersed throughout Australian suburbs, with members of their own community living many kilometres away (Liamputtong et al., 2015; Walker et al., 2015). The women were provided with mobile phones and free calls for at least one year and received peer support training once a week for six weeks and regular meetings thereafter (Walker et al., 2015). This blended approach triggered the establishment of stronger relationships, helping the refugee women to overcome isolation and develop a sense of happiness (Liamputtong et al., 2015, p. 5). Another way of better connecting refugees and local populations is through the **establishment of joint learning programmes**, such as the cooperation between Coursera and the US State Department shows. A massive open online course, or MOOC, was used with a mixed group of twenty-six Lebanese and refugee participants, with the goal of facilitating the development of a joint understanding among the group of learners (Ikonomou, 2016).

Reflections and emerging practice

The finding that mobile media serve as a key resource for refugees to overcome isolation and loneliness and to create informal local and global learning networks is supported by a range of qualitative and ethnographic studies. These networked spaces are used to engage with ties back home or in the diaspora, and with similar milieus in their host settings.

Although the networks are significant from connectivist, participatory and socio-emotional learning perspectives, refugees' access to mobile connectivity and its associated benefits is not equally distributed. To help refugees realize the benefits of connecting with their social networks, they need additional infrastructural support, such as power supply or airtime.

In addition, mobile connectedness does not automatically aid the inclusion of refugees in the mainstream cultures of their host environments. Refugees can find it difficult to break away from their co-ethnic bonding networks, for example, due to language barriers and a lack of trust of outsiders, which can hinder integration (Bacishoga and Johnston, 2013, p. 9).

Ways to further leverage the largely unacknowledged and untapped potential of these networks are thus not only to create conditions that allow refugees and immigrants to better connect with peers, but also to strengthen their systematic connections with host cultures. In addition to offering joint mobile learning programmes, another approach would be to gradually enrich mobile peer support projects with interactions with volunteer native participants, blending conversation in collocated and digital spaces. The use of digital social media and instant messaging tools to connect refugees with volunteers in the context of the Syrian refugee crisis for instrumental purposes is indicative of their potential to facilitate inclusion and integration. This is all the more important because effective inclusion measures involve not only refugees but also host populations, and thus far the overwhelming majority of mobile learning initiatives conceive of refugees as the only beneficiaries.

In this chapter, key areas of individual challenges linked to the refugee experience were unpacked. The examples discussed show how mobile learning can help address these challenges but also make clear that mobile solutions alone cannot resolve each issue a refugee might encounter on the journey from flight to resettlement in a new host country. Nonetheless, the role that mobile technology can play in transforming the experiences of individual refugees demonstrates the potential for positive impact. It would be worthwhile to enlarge the evidence base in order to guide the elaboration of new or improved opportunities for mobile solutions to contribute to lowering barriers that individual refugees may encounter.

The next chapter moves from individual challenges to education system challenges, in order to understand how mobile learning is intertwined with wider education systems in contexts involving refugees and displaced populations.

Mobile learning to address education system challenges

Mobile learning to address education system challenges

Some of the education-related challenges facing refugees transcend individual experiences, education levels and domains, and instead stem from issues in the education system more broadly. These can include:

- Teachers who are unprepared for education for refugees
- A scarcity of appropriate learning and teaching resources
- Undocumented and uncertified educational progress

Teachers unprepared for education for refugees

Scope of the challenge and educational implications

Teachers are of utmost importance in the provision of equitable and inclusive quality education for refugees and displaced persons. They can not only address children's physical and cognitive needs but also facilitate their psychosocial well-being and serve as a key resource in achieving normality (Kirk and Winthrop, 2007; Winthrop and Kirk, 2005). Teachers who work with refugees operate in different settings and can have heterogeneous backgrounds. They could be trained/certified teachers who are refugees themselves, or teachers who are refugees but have no prior teaching experience and are trained out of necessity, or finally teachers in host settings who work with refugees in their classrooms. Thus the challenges associated with the preparedness of teachers to work in settings with refugees are equally varied.

Qualified teachers are a highly demanded but rare resource across all levels and domains of education for refugees. This translates into large class sizes and high student/teacher ratios. Although the 2010–2012 UNHCR Education Strategy sets the goal of a maximum of 40 students per single teacher (UNHCR, 2012, p. 12), many refugee contexts have even larger class sizes. With a global rise of 30 per cent in 2014 only, the increasing number of school-age refugees further exacerbates the issue of availability of qualified teachers. It is estimated that at least 20,000 additional teachers and 12,000 additional classrooms would be needed on a yearly basis (UNHCR, 2016d, p. 8).

The quality of teacher education is another major concern. In many rural settings and camp situations, instructors do not have even the ten days of training that would qualify them as 'trained' (Dryden-Peterson, 2011, p. 6), and even

in high income countries affected by an influx of refugees, well-qualified teachers are often in short supply (UNHCR, 2016d, p. 11).

Qualified teachers are a very rare resource, and in many rural refugee settings instructors do not have even the ten days of training that would qualify them as 'trained'.

In addition to basic qualifications, teachers need specific training to prepare them to address the particular needs and challenges that refugees bring into the classroom. Although pedagogical standards emphasize the necessity of participatory and student-centred teaching, education in refugee contexts tends to be focused on mere transmission of knowledge from teachers to learners. Teachers who are poorly qualified tend to not involve or stimulate students but rather treat them as passive recipients of information (Dryden-Peterson, 2015b, pp. 10–11). Teacher- and lecture-centred education has been found across different refugee settings, including Gaza, Jordan, Lebanon, Syria, the West Bank (Hardman, 2014, p. 7) and Kenya (Mendenhall et al., 2015). The fact that many students come from illiterate backgrounds can be challenging even for well-qualified teachers in high income countries, for instance when it comes to adapting educational materials (Brown et al., 2006). In addition, teachers are often unprepared to address the emotional demands of their students. For example, a rapid needs assessment conducted by UNICEF revealed that in Lebanon neither principals nor teachers knew exactly how to deal with the particular needs of displaced Syrians (UNICEF and Save the Children, 2012, pp. 4–5). In the worst cases, teachers may end up bullying their pupils instead of offering them protective and inclusive environments (UNHCR Innovation, 2016, p. 12), as is particularly the case in urban settings (Dryden-Peterson, 2011, p. 44).

Teachers of refugees need to be prepared and supported to operate in the most difficult conditions: to activate and engage highly diverse, illiterate and traumatized students with limited host language skills.

Many existing programmes focus on short in-service training units. However, the lack of mechanisms for ongoing support and supervision structures, as well as for compensation and incentives, impacts not only teachers' performance but also their motivation, absenteeism and retention rates (Dryden-Peterson, 2011, pp. 54–57). In camps, teachers are often

refugees themselves, with low education levels and a high degree of vulnerability. This makes it necessary to equip them with the appropriate methodological repertoire and to address and support their well-being (Mendenhall, 2017).

Teachers in high income countries also need to be prepared and qualified to work with refugee learners. For instance, studies in the USA and Canada indicate that trauma experienced during crisis situations, during escape from their place of origin, in camps and during resettlement processes makes many refugees distrustful or fearful of authorities, including schoolteachers (Kanu, 2008, p. 924; McBrien, 2005, p. 344). In addition, refugees may be so accustomed to transmission-based teaching that their integration in education cultures with more self-directed forms of learning may prove problematic (Ager and Strang, 2008, p. 172; Dryden-Peterson, 2015b, p. 2; Kanu, 2008; McBrien, 2005, p. 346). In these contexts, where many children report feeling lost (Kanu, 2008, p. 924), teachers need to support refugee learners through active engagement in the classroom (Dryden-Peterson, 2015b, p. 2).

Assumptions and evidence base

The potential of mobile learning to support teachers' professional development has been a trending topic in recent years, with UNESCO's numerous reports on mobile learning for teachers in Latin and North America, Europe, Asia, Africa and the Middle East representing one body of work particularly relevant to exploring this subject. The assumptions are that mobile solutions and devices can contribute to enhanced educational efficiency by supporting teachers in developing and applying a broad array of skills in the classroom (West, 2012).

The current evidence base regarding mobile learning for teacher training in refugee contexts is surprisingly scarce. Studies with a robust evaluation conducted in this area could not be found. However, there are some indications that mobile learning can be used to provide mentoring and ongoing support to teachers. Additionally, some lessons can be learned from other teacher training initiatives in low-resource settings that incorporate basic technologies. The examples discussed in this section point to the value of mobile learning to help teachers of refugees improve their day-to-day teaching practice.

Current practices and projects

Mobile teacher training and support

The **Teachers for Teachers project** in Kenya incorporates a rich professional teacher development approach with a mobile mentoring element. After onsite training, and in addition to a face-to-face coaching component, mobile

instant messaging is used to facilitate continuous learning and ongoing support. The project operates in the Kenyan refugee camp of Kakuma, where the student/teacher ratio is about 100:1. Less than one-third of the teachers are trained, and the great majority of them are refugees themselves. Many of them may not have benefited from systematic schooling, and some struggle with psychosocial and emotional issues stemming from their experiences as refugees (Mendenhall, 2017; Teachers College, n.d.).

The training in the Teachers for Teachers project is based on a curriculum that incorporates freely available training materials developed by the Teachers in Crisis Contexts Working Group, a network founded in April 2014 that comprises seven partner agencies – Finn Church Aid, International Rescue Committee, Norwegian Refugee Council, Save the Children, Teachers College at Columbia University, UNHCR and UNICEF – and works in close association with the Inter-Agency Network for Education in Emergencies. The training curriculum consists of five main competency pillars: (1) teachers' role and well-being, (2) child protection, well-being and inclusion, (3) pedagogy, (4) curriculum and planning, and (5) subject knowledge. The onsite training is complemented by peer coaching and observation carried out by teachers who have completed the programme and received additional mentorship training (Bergin, n.d.).

The use of instant messaging spaces for mentoring can not only facilitate the repetition and application of training knowledge but also mediate instantaneous support for profound problems that teachers face in classrooms.

The supplementary mobile learning component is organized in the form of WhatsApp groups, through which global mentors, who are volunteers with extensive classroom teaching experience, facilitate discussions with groups of four to five teachers. The mentors guide the teacher trainees according to a suggested (and openly available) online mentoring curriculum, which provides scheduled core and follow-up messages, questions and instructive images and videos, with the goal of helping the teachers put their knowledge into practice and sustaining the effects of training in the longer term. Mentors reiterate key lessons from the curriculum through statements such as: 'Constantly move around the classroom while teaching. Make sure there is at least one walkway through the students so that you can get to the back of the room.' They also try to stimulate teachers' motivation and self-reflection with short assignments such as 'Set yourself a goal for this week to help you feel motivated at work' and questions like 'Did you achieve your goal this week? Why were you able to achieve it? Why not? What can you do differently next week?'

Evidence shows that teachers find the discussion groups valuable because they can receive instantaneous advice on pressing problems they face in their classrooms, not only from mentors but also from their peers. The depth of the discussions and the gravity of the challenges teachers face is sometimes profound and reaches beyond educational issues. For example, teachers feel they can open up on topics that cannot be discussed in the camp setting, such as suspicions of sexual violence. The global mentors receive initial and ongoing support on how to address these issues, and 'silent observers' in the groups can intervene in the event of serious problems such as health and safety concerns.

Other projects use mobile technology to support teachers' face-to-face training with online and mobile content. The **Borderless Higher Education for Refugees (BHER)** project provides teacher training to qualify untrained teachers in the Kenyan refugee camps of Dadaab. While the main lecturing component takes place onsite, students can use tablets to access a learning management system that features textbooks, videos and articles. Similarly, the **Connect to Learn (CTL)** programme enables Syrian teachers in Iraq's Domiz refugee camp to access digital resources via a cloud-based server. The content focuses on social-emotional skills, literacy and numeracy, and teachers can also use the technology to share their experiences with peers across the different camp schools (Dahya, 2016).

Teacher training programmes have also started to leverage blended learning through massive open online courses, known as MOOCs. Examples of online teacher training are **Edraak** ('realization' in Arabic), an Arabic-language MOOC platform implemented by the Queen Rania Foundation, or the **Jesuit Worldwide Learning (JWL) teacher training programme** (Gladwell et al., 2016*a*).

Reflections and emerging practice

Although the evidence base on the added value of mobile solutions for teacher training is still being established, some of the design elements applied in the projects examined in the framework of this report appear to be promising. Considering the high levels of attrition and the short induction trainings for teachers in refugee settings, the support that mobile mentoring can provide to help reiterate and apply key messages and better connect local and global practitioners appears valuable. This is all the more promising because it can be achieved by technologically simple and increasingly popular means. In addition, technology enables sustained

conversational learning, which is otherwise difficult to achieve once in-person training has ended.

Successful ICT4D (ICT for Development) projects outside refugee contexts can also be seen as models for the use of simple technologies to support teachers in classrooms where hardly any books are available. The **SMS Story** project in Papua New Guinea leveraged SMS technology to provide stories and lesson plans to teachers in rural and low-resource settings with limited access to textbooks. An instructional poster and a total of 100 messages sent over a period of two academic terms resulted in significantly higher student achievement across four of the five reading skills tested, in comparison with the pupils in the control group. The number of children who could not read anything by the end of the programme was almost half of that in the control schools. The approach is certainly no panacea and should not be seen as a long-term solution to replace the use of textbooks, as no significant differences were observed with respect to reading comprehension (Kaleebu et al., 2013). However, it is one of the few low-cost and simple technology approaches that has shown some impact on students and is likely to also be effective in refugee contexts in which teacher support as well as literacy skills are key.

A **UNESCO–Nokia teacher training project** in Nigeria illustrates teachers' interest in receiving phone-based practice and professional guidance. Over a fifty-two-week period, primary school teachers were provided with short daily messages including an image and text of 50 to 100 words on how to plan, manage and assess their progress in English language and literacy classes. The pilot evaluation concluded that the use of simple mobile solutions can effectively improve the professional capacity of English-language primary school teachers. The analysis also found that the intervention enhanced feelings of connectedness among teachers who trained together in small groups. Teachers attached particular value to messages containing concrete ideas for lessons (in contrast to general pedagogical instruction), stimulating questions and reflective prompts. Perhaps the most interesting finding is that the initial number of 50 teachers increased to 70,000 when subscription to the service was opened to people outside the project context (Miao et al., 2017).

In light of these examples, it can be stated that mobile learning for teacher training is still in the nascent stages but could be useful in lowering some of the barriers that negatively impact refugee learners in education systems the world over.

A teacher's perspective

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Romans is a South Sudanese refugee who works as a teacher in Kenya's Kakuma refugee camp, a context where basic educational infrastructure is insufficient and overcrowded classrooms are the norm. As a participant in the Teachers for Teachers project, he uses mobile instant messaging to receive advice on pressing problems from fellow teachers and his global mentor.

Romans is a South Sudanese refugee who was forced to leave his country at the age of 7, fleeing over the border into Kenya. He escaped to the refugee camp in Kakuma, where he attended primary school. After completing secondary education outside of the camp, he came back to Kakuma and began teaching in 2015 at a local primary school, in a context plagued by inadequate infrastructure and insufficient teaching and learning materials.

'My classroom is large, with 180 students. We have desks, although there are not enough for everyone.'

While Romans undoubtedly has insider knowledge about the challenges and strengths of the refugee children he teaches, he did not have any prior teaching experience or professional teacher training. This limited the set of skills he could draw on in the classroom. In 2016, he joined Teachers College of Columbia University's Teachers for Teachers initiative, a professional development programme for primary school teachers in Kakuma. An integrated model for continuous support, Teachers for Teachers combines onsite teacher training with peer coaching and mobile mentoring. The mobile mentoring component connects refugee teachers based in Kakuma with experienced and passionate educators outside the camp via WhatsApp. These global mentors

provide ongoing support, pedagogical tips and suggestions on how to address teaching challenges. Romans likes mobile mentoring because he receives instant advice and support from his mentor and other teachers on questions regarding difficult teaching situations:

'The mentoring programme on WhatsApp has been really helpful. When there is an issue that I'm facing, I post it to the group. Then Kevin, the global mentor, or my other teacher colleagues give feedback on how it could be tackled.'

According to Romans, one of the most valuable benefits of the mobile mentoring programme is the social learning design element, which helps him feel like he is not alone as he navigates the demands of teaching. Also, he appreciates that the initiative allows him to solicit ideas about how to cope with difficult situations in his classroom. Giving a concrete example of a problem he posted on the WhatsApp group, Romans describes a situation where he did not want to promote some of his students, because their near-failing marks demonstrated that they were unprepared to move on to the next grade:

'One of the teachers recommended I call the parents to discuss the issue, and if the parents think the student should be promoted with those marks, I should do it. My mentor added that I should tell the parents the positive and negative outcomes. I put this advice into practice. The parents appreciated our conversation and agreed that their children should repeat the grade to build a stronger foundation for the future.'

Yet the support that can be gained through mobile mentoring is not without barriers of its own. Timely responses are necessary so that Teachers for Teachers can remain effective in helping refugee teachers try new strategies and solutions to overcome the challenges they face at school.

'I love the mentoring programme because I get new ideas that I didn't have before. The only limitation is time. For example, I can post a challenge now and it can take time for my mentor to respond, because we are in Africa and he is in the US, so time is the only difficulty.'

Romans' experiences underscore the opportunities that mobile technologies offer in providing instant support and continuous development for teachers in refugee contexts, so that they can enhance their professional competencies.

Scarcity of appropriate learning and teaching resources

Scope of the challenge and educational implications

In refugee contexts, limited access to teaching and learning materials can further exacerbate the challenges faced by teachers, who often do not have adequate training and support to meet the needs of refugee learners. At the same time, when refugee learners do not have access to educational materials at school or in their homes, the process of adapting to their new learning environment may become even more burdensome than it would normally be. The scarcity of appropriate teaching and learning materials, such as textbooks and other teaching resources, in low and middle income countries (Dryden-Peterson, 2011, p. 31) can amplify the impact of the individual challenges discussed in the section "Mobile learning to address individual challenges".

A report from Mendenhall et al. (2015, p. 114) found that some classes in a refugee context in Kenya had to rotate sets of books among pupils, and in some classes no one had a text. In addition to materials for core subjects, pupils and teachers in Nairobi and in the refugee camp in Kakuma voiced the need for more supplementary learning materials. Another typical example is the situation of Sudanese refugee children in Chad: due to a lack of desks, many children sit on mats on the ground while the teacher, who is the only person with a textbook, writes notes on the blackboard (UNHCR, 2016*d*, p. 17).

The dearth of physical resources is often compounded by curricula that have limited relevance for refugee learners' particular situations and backgrounds. For example, in a Kenyan refugee study, teachers bemoaned the fact that elements in the curriculum lacked relevance to the lives of many of the refugee pupils (Mendenhall et al., 2015, pp. 118–19). Sometimes the problem is not the lack of learning materials but rather their political nature. In many areas, curricula and learning resources are biased towards one side of a conflict, buttress stereotypes or worsen political and social grievances (UNESCO, 2016, pp. 103–4). Also, host country teachers are often not familiar with the curricula or contexts of refugee students' home countries.

Learning materials in refugee contexts are often missing or, when they do exist, can lack relevance or be politically biased.

Assumptions and evidence base

The educational response to the refugee crisis has identified in digital resources, and particularly in open educational resources, or OER, one possible avenue for addressing a variety of educational challenges, ranging from increasing access to textbooks and learning materials to improving education quality and reducing costs (Miao et al., 2016). The main potential associated with OER in crisis and refugee settings is that they can be adapted to local needs and rapidly implemented at low cost via mobile networks or other offline distribution mechanisms (Dahya, 2016; World Bank, 2016). Many of the resources currently used in refugee settings are freely accessible. However, their implementation is not without its own challenges. Resources tend to be scattered and distributed across different platforms, are often not harmonized or compatible, and frequently lack quality control. All of these limitations render the identification, evaluation and reuse of OER a difficult endeavour, especially in refugee contexts. Moreover, the majority of available OER are in English. There is an unmet demand for content in languages such as Arabic as well as content aligned with local curricula.

Given this set of circumstances, it is necessary to discern what educational materials relevant to refugee contexts have been developed and made accessible through mobile learning projects to date.

Current practices and projects

The development of new content, as well as the evaluation, selection and adaptation of existing content, is a persistent challenge in many mobile learning projects in refugee settings and beyond. A large number of content platforms have been used in education for refugees. Although some commercial providers have offered their content, most projects are leveraging content that is openly available. As the next two examples of platforms show, the lack of connectivity in many rural refugee contexts, especially those in low-resource settings, calls for the availability of offline content. The content platforms currently used in education for refugees range from static library repositories, digitized reference books and online encyclopedias, such as Wikipedia, to rich multimedia platforms with high levels of interactivity and monitoring features to track student progress.

KA Lite is a lightweight server that can be positioned on the dynamic and interactive end of this spectrum. The open-source multimedia platform, which is also used by UNICEF's Raspberry Pi for Learning (Pi4L) Initiative for refugees in Lebanon, reproduces the features of the online version of the **Khan Academy** in an offline environment, making this content available to learners with limited internet connectivity. Teachers and learners can select from thousands

of videos and exercises in ten different languages, including English and Arabic. This platform also provides interactive feedback in mathematics, science, history and economics, among other subjects. A point system is meant to encourage learners' continued engagement, and automatically generated reports allow teachers or parents to track students' progress (Learning Equality, n.d.).

The meta-platform **RACHEL Offline** incorporates a bundle of resources, including different learning and informational resources such as Wikipedia, Khan Academy and health information packages, that can be retrieved and loaded onto mobile devices (RACHEL Offline, n.d.). The digital materials are used in the **Instant Network School project**, which provides tablets preloaded with content to support school-based learning and teaching in various refugee settings in Africa.

Open educational resources are increasingly used in refugee projects, with some incorporating crowdsourcing approaches. However, resources tend to be scattered and difficult to identify, unharmonized or incompatible, and predominantly available in English.

While the aforementioned resources offer general educational materials, other platforms are geared towards the provision of materials following specific national curricula. **Tabshoura** ('chalk' in Arabic), for instance, is an initiative that provides free trilingual learning materials from kindergarten to university based on the Lebanese curriculum. The online platform, which draws on the learning management system Moodle, is organized by subject and grade and is freely accessible online. To date, the development and use of 2,350 educational activities has been piloted in early childhood education (Lebanese Alternative Learning, n.d.*a)*. The content is used by diverse projects and initiatives in the context of the Syrian refugee crisis (Lebanese Alternative Learning, n.d.*b).

Nafham ('we understand' in Arabic) is an OER initiative that provides online access to learning resources such as instructional videos. Nafham takes an interesting approach by including a crowdsourcing component, as some of the videos are generated by users (Nafham, 2016). Out of the more than 15,000 educational videos for primary and secondary school learners from Egypt, Turkey, Lebanon, Jordan, Saudi Arabia and Syria, more than 4,500 are crowdsourced (Center for Education Innovations, n.d.; Farahat, n.d.). According to the organization, approximately 1,000 videos cover about 35 per cent of the Syrian curriculum. The content is categorized by grade, subject, term and academic schedule (Nafham, 2016), and peer quality control is facilitated through a button that allows users to indicate if they understood the instructions in a particular video (Center for Education Innovations, n.d.). Video lessons from Nafham are used by **Rumie's Learn Syria**

initiative, which provides tablets preloaded with educational materials to Syrian refugees.

These examples provide insight into the types of initiatives that could help make educational materials available to teachers and learners in refugee contexts. Yet they also indicate the large scope of activities involved in implementing and sustaining such initiatives, which may limit feasibility in practice.

Reflections and emerging practice

Duplication of efforts and a lack of coordination among stakeholders is a major criticism raised against experiments with mobile-based processes intended to bridge education system gaps and help teachers and learners in refugee contexts access educational content. This is compounded by the fact that often initiatives and applications are not properly contextualized to the needs of the beneficiary populations. Because existing synergies are not adequately leveraged, educational content is constantly being reinvented, recreated and, if taken from freely available sources, re-evaluated. There is a demand for initiatives and platforms that identify existing content, review its quality (in part by measuring it against national or international curricula and standards), and link or aggregate it centrally on online and mobile portals, while making it available for offline usage as well. In addition to making the best of limited resources by avoiding the duplication of efforts, a systematic and curriculum-oriented structure could help detect and address gaps in content and topics.

In spite of efforts being made to develop new content, the vast majority of open and available educational resources is in English. There is an unmet need for materials in local languages as well as content that is tailored to local curricula or matched with international teaching standards. This is particularly though not exclusively the case for OER in Arabic (Miao et al., 2016, p. 224), as demand for the latter has spiked in the wake of the Syrian refugee crisis. In addition to Nafham and Arabic versions of Khan Academy, some open access repositories in North America and Saudi Arabia host and curate Arabic-language materials, but the quantity of materials available to date is limited (World Bank, 2016, p. 7).

Existing educational platforms also need improved content structuring mechanisms. A successful educational platform could use classifiers such as curriculum orientation, level of schooling, language, resource type, study time, device compatibility, and user rating and comments. The multistakeholder partnership mPowering Frontline Health Workers, which created the platform **ORB** in the framework of a health-related initiative, could represent a good example to follow. ORB offers open and quality-reviewed content to health workers across the world in a highly structured and accessible format. While platforms of this kind

could be invaluable if used at the primary and secondary education levels, the growing number of MOOCs and higher education resources require additional oversight as well as higher degrees of openness (see also section 4.3 for more information on MOOCs).

In addition to the provision of structured online and offline content, there is also a need to incorporate pedagogical design into the OER development process (Miao et al., 2016, p. 225). In refugee contexts, it is particularly relevant to provide mechanisms that assess, visualize and aggregate learners' progress. For example, the experience from the **TIGER Girls** programme (see section 4.1.3.2) shows that personalizing the dashboard and tracking features of the Open Learning Exchange (OLE) system allow refugee learners to explore and study in a self-directed manner, while teachers and easily trained coaches can manage teams of girls with heterogeneous levels of prior knowledge, which is a common occurrence in refugee settings. Using their dashboard, teachers and coaches can review the progress of the whole class and steer specific support to students experiencing difficulties (Rowe, 2016).

Undocumented and uncertified educational progression

Scope of the challenge and educational implications

Educational planners and managers face exceptional demands in times of crisis (Sinclair, 2002). In these contexts, education data at the individual, school and system levels tend to be poorly documented, and the low levels of granularity make it difficult to obtain nationwide overviews of aggregate statistics. Missing, incomplete or low-quality information drastically impedes the capacity of ministries of education and development organizations to rebuild, plan and manage education programmes involving refugees. This problem is tied to the lack of effective education management information systems (EMISs), which not only restricts capacity to monitor progress but also limits further planning and budgeting of the immediate response, as has been highlighted in the context of the Syrian refugee crisis (Syria Crisis Education, 2016). Accordingly, developing and implementing simple but flexible information systems to ensure the availability and use of quality data through functional EMISs is a key measure for system strengthening in emergency settings.

The lack of reliable data in volatile crisis settings inhibits the rebuilding, planning and managing of entire education systems and highlights the need for simple yet flexible digital information systems.

A lack of data on refugees' progress and attainments also contributes to the disruption of their educational pathways, especially when they move from one place to another. Following flight, refugees' chances to continue education in the host settings may be hindered by the fact that they may not carry their paper-based educational certificates with them. In some instances, refugees have gone to extreme lengths, including undertaking life-threatening trips back home, to obtain this documentation (Gladwell et al., 2016*a*).

Additionally, education in settings of encampment, including through online and mobile learning programmes and courses, is often informal, undocumented and unaccredited. Online learning is not only valued less because of cultural beliefs about traditional delivery channels but also because online learning programmes tend to be associated with weak or non-existent forms of accreditation (Lorisika et al., 2015, p. 33). Education formats without a clear path to certification and diplomas can demotivate refugees (World Bank, 2016, p. 11) and even prevent them from continuing their education or developing hope for their future. Especially critical is the situation in camps and protracted displacement situations, in which, using the words of Waters and LeBlanc (2005, p. 144), 'the myth of progress is implausible and many refugees have lost whatever future they formerly dreamed of'. Furthermore, even official certificates are not consistently acknowledged across nations and education systems. A study from UNHCR found that school diplomas and certificates from the country of origin were not recognized in seventeen host countries in 2010 (UNHCR, 2011*b*, as cited in Dryden-Peterson, 2011, p. 31). For instance, despite the Lebanese government's intention to include all displaced Syrian students in the country's school system, their entrance is obstructed by a lack of school and course certificates and legal barriers (UNICEF and Save the Children, 2012, p. 5). The problem of educational continuity remains when refugees move to high income countries or up the education system into higher and university education. Despite their high ambitions, refugees are often placed in low-level classes (McBrien, 2005; Suárez-Orozco, 1989) based on their local language skills rather than on their academic abilities. Deskilling represents one of the major causes of frustration, as exemplified by a study on refugees in Canadian high schools (Kanu, 2008, p. 924).

Lost certificates, uncertified achievements and unacknowledged certifications severely constrain refugees' educational trajectories as they move from one place to another.

The sum of these barriers related to documenting and certifying evidence of previous educational attainment can contribute to a sense of disorientation and isolation for refugees. It is worthwhile to investigate how digital solutions might help prevent the disruption of educational trajectories for refugee learners.

Assumptions and evidence base

There is often an expectation that the use of ICTs can greatly help in collecting, aggregating and analysing education data in crisis and refugee settings. The idea is that improved data availability and quality can significantly enhance the planning, managing and monitoring of education systems.

The projects analysed in this section reveal that mobile technology can play an essential role in maintaining or establishing basic functions of education systems, especially in low-resource and low-infrastructure settings. In these contexts, mobile devices are often the only available technology that allows quick data capture on available infrastructure, teacher and student numbers, and other information, potentially enabling more rapid and appropriate responses.

Importantly, the analysis also illustrates the limitations of current technological approaches in addressing the challenge of documenting and certifying refugees' educational progress. This is due in part to the fact that refugees generally flee from contexts where education certificates are not stored in a digital format, and they are often unable to prove prior educational attainments if they lose the paper-based versions they have received. Furthermore, while information systems in crisis and emergency settings tend to collect data at class, school or regional levels, some do not document individual attainments that would help refugees substantiate their educational background.

The inability to document and recognize prior achievements and the political and structural barriers in this area are profound concerns that go beyond technological issues. Solutions to these challenges should begin with establishing the necessary political and regulatory frameworks to help support digital achievement recognition and certification, and technology can only support these processes. The role that technology can play in documenting and certifying educational data has been explored in some refugee contexts with varying degrees of scale.

Current practices and projects

In crisis and refugee settings, data and progress at the level of learners, classes, schools and systems are often poorly, if at all, documented and aggregated. At the system level, this lack of information poses challenges in planning, operating and monitoring educational programmes and entire education systems. On an individual level, the lack of data, especially regarding students' prior educational attainments and certificates obtained, restricts or destroys refugees' chances of continuing their educational trajectories as they move from one place to another. Addressing these two challenges requires the documentation and visualization of educational data and student progress through flexible digital information systems.

Documentation and management to strengthen education systems

A few platforms collect and analyse data for the planning and management of education systems in refugee contexts. These products have incorporated technologies with differing functional repertoires. For example, EduTrac leverages simple SMS technology, Kmobile Schools is a mobile app, and OpenEMIS incorporates a suite of interrelated software that can be used on various mobile and non-mobile devices.

EduTrac is a simple data collection and monitoring tool used in refugee contexts in Uganda. It draws on RapidSMS technology, with the goal of supporting districts in planning activities and providing better and quicker supervision to schools. Head teachers and administrators regularly convey information on pupil and teacher attendance, child abuse and capitation grants via SMS (RapidSMS, n.d.). Starting in 2011, the system was improved through an iterative process. First, to structure the collection of data, an SMS-based poll system has been developed. People respond to structured text messages such as: 'How many P3 [particular class/grade] boys are at school today?' The data are subsequently visualized on an internet dashboard (UNICEF, 2013). The system involves 9,093 reporters and 2,819 schools (RapidSMS, n.d.). Tracking refugee enrolments in northern Uganda allowed UNICEF and the Ministry of Education to quickly develop data-based responses to issues that previously would have taken weeks to address (Llamazares and Mulloy, 2014). The system's mobility and simplicity make it conducive to ad hoc use in volatile refugee and crisis contexts.

Kmobile Schools is an app developed by the non-profit organization FHI 360 for Android-based tablets and smartphones that can be used to collect and analyse critical education indicators in refugee camps and urban areas (Dahya, 2016). These include exact school locations and related photographs, the number of students and teachers present at any given time, and the types and numbers of facilities (such as classrooms and latrines) and textbooks available (FHI 360, 2013, n.d.). Once data are uploaded, they can be displayed and analysed via Google Earth. The open-

source app was designed for UNHCR (FHI 360, 2013) and has been deployed in South Sudan, Sierra Leone and other UNHCR-supported countries to track and detail education offerings for refugees (Dahya, 2016, p. 13). FHI 360 claims that its app has helped reduce data collection and reporting time by at least 30 per cent (FHI 360, 2013).

The open-source education management information system **OpenEMIS**, which was developed by UNESCO and is being used in refugee contexts in Malaysia and Jordan, presents an even broader range of functionalities. The tool incorporates RapidSMS technology and enables the regular collection, aggregation and analysis of detailed data at national, regional, school, class and individual levels (OpenEMIS, 2016). OpenEMIS was implemented by UNHCR in Malaysia in 2012 to track the educational progress of 33,000 refugee children and to help bring this group with low school enrolment rates back into classrooms. By 2015, data from 48,000 refugee children and 700 staff in 142 education sites had been collected and analysed in Malaysia (OpenEMIS, 2016).

The incorporation of mobile and SMS technologies in education management information systems and their adaptation to refugee contexts are key in reaching refugee populations who are constantly on the move.

In the context of the Syrian refugee crisis, OpenEMIS is being leveraged on a much larger scale. In 2014, it was implemented with the support of UNESCO in schools and education centres in the Zaatari refugee camp in Jordan. The system proved to be particularly valuable in addressing the specific issues faced by refugees, such as their mobility patterns, the lack of internet connection and challenges related to the types of recognized identification documents. In refugee settings, children often do not have national identification numbers; OpenEMIS circumvents this issue by assigning a new, unique identification number to students in order to track their progress (Izaguirre, 2016). The lack of internet connection was addressed by developing a local network and a server preloaded with the OpenEMIS system, with regular offline exchanges synchronizing the data with the central system. To account for the mobility in Jordanian refugee settings and to harness the availability of simple mobile phones, text messaging capabilities were implemented to collect EMIS data. The experience in this refugee setting has led the Jordanian government to roll out the system nationwide. Today, OpenEMIS Jordan covers more than 2,160,000 students and 140,000 staff in 6,893 schools (OpenEMIS, 2017).

YOBIS, Turkey's EMIS for foreign students, also tracks enrolment, attendance and performance and generates report cards and diplomas/certificates (UNICEF, 2015) for non-Turkish students including Syrian refugees (Syria Crisis Education, 2016; World Bank, 2016). A recommendation is to

further develop YOBIS to better track attendance and learning achievements and to support policy-makers in making informed decisions (Syria Crisis Education, 2016).

Documentation and certification to ensure learners' educational trajectories

The documentation and validation of prior educational experience is a recurring challenge for refugees. People who flee their homes might not have the chance to bring their paper-based documentation with them. Also, some might come from education systems with no mechanisms and infrastructures for documenting educational trajectories. Insufficient documentation and certification creates issues when refugees seek to continue their education in host countries with little to no information on their backgrounds.

Mobile solutions can be used to document and certify the educational trajectories of refugee learners. Flexible information systems used in refugee contexts, such as YOBIS or OpenEMIS, allow for the production, reproduction and digital display of school certificates in the event that physical copies get lost during displacement. In this way, the documentation features can substantially enhance refugees' chances of continuing their education in a different place. In OpenEMIS, all educational achievements are linked to students' individual digital profiles, and paper-based education certificates, for example from pre-primary level, can be attached as digital photographs (Izaguirre, 2016).

In crisis settings, education initiatives, particularly digital learning courses, are often not certified and thus are less valuable to refugees. Novel solutions should add certifications to digital and mobile learning programmes. On a degree level, the higher education MOOC-based initiative **Kiron** (see 4.3.3.2) has developed approaches to tackle parts of this problem by combining off-the-shelf MOOCs with on-campus degree programmes. Kiron's partner universities agree to recognize the credits that refugees gain through the successful completion of the MOOCs and allow students to complete certified degree programmes during the on-campus phase (Kiron, n.d.*d*). In addition, the programme enables refugee students to begin the online portion of their studies regardless of their location. This can help refugees to start immediately while waiting for their asylum status to be granted (Kiron, n.d.*a*). However, a persistent challenge is that refugees need to be accepted by the respective partner university and their higher education entrance qualification needs to be verified by these partners (Rampelt, 2017).

Universities that take the lead in education projects for refugees have an advantage as they can directly award certifications for courses, modules and entire degree programmes. For example, certificates for **InZone**'s onsite and digital learning programmes (see 4.2.3.2) are awarded by university partners such as the University of Geneva or

Princeton University (Moser-Mercer, 2017). In the **Jamiya Project**'s blended learning courses (see section 4.3.3.3), European universities act as development and certification partners, with the goal of providing a certified one-year programme equivalent to the first year of a university degree (Gladwell et al., 2016*a*, p. 19; Jamiya press release, 2016).

Finally, systemic approaches are being adopted to encourage the establishment of formal regulatory frameworks and procedures for the recognition of refugees' prior educational attainment. For the European region, one example is the Recommendation on the Recognition of Qualifications Held by Refugees, Displaced Persons and Persons in a Refugee-like Situation, adopted in November 2017 as part of the framework of the Council of Europe/UNESCO Convention on the Recognition of Qualifications concerning Higher Education in the European Region (the Lisbon Recognition Convention). The recommendation invites countries to facilitate the integration of refugees and displaced populations in their education systems and advocates for the establishment of assessment mechanisms to be applied when proof of prior qualifications is not available (Lisbon Recognition Convention Committee, 2017).

Reflections and emerging practice

In crisis contexts, EMISs are the digital applications that have reached the largest scale to date and can thus offer a number of lessons learned. First, the process of contextualizing tools to local and national contexts is complex and lengthy. Second, implementation can be strengthened if there is a clear governance and ownership model, with the government, and specifically the ministries of education, taking a leading role among stakeholders and sponsors. The open-source foundation of some EMISs can also be an advantage. For example, with OpenEMIS, technological innovations implemented in one country are freely available for use in all other countries (Izaguirre, 2016). Although the technical systems examined are not solely mobile, the incorporation of mobile and SMS technologies to reach refugees in volatile contexts is key. Lean, SMS-based applications, such as EduTrac in Uganda, are easier to implement and can be deployed faster in crisis settings compared with more robust systems. OpenEMIS is typically implemented in a three-year cycle, in order to customize the system according to the needs of the respective setting. However, once systems become more established, they can include not only the planning and allocation of resources but also the documentation and acknowledgement of refugees' individual educational progress.

In light of ongoing and recurring crisis dynamics, the central questions to be examined are whether national information systems are prepared to address potential crises, and whether EMISs in host settings are capable of including

refugee learners as an integral part of their processes. While current solutions partly address the challenge, they will encounter a bottleneck effect if they are not aligned with adequate regulatory frameworks that recognize learners' prior attainments and reintegrate them into formal education systems. For the European region, the 2017 Recommendation on the Recognition of Qualifications Held by Refugees, Displaced Persons and Persons in a Refugee-like Situation represents a step in this direction that could be replicated in other parts of the world.

From a strategic and long-term perspective, it would be relevant to develop a holistic approach for crisis and refugee situations, perhaps in the form of internationally accepted and customizable refugee curricula. An intermediate step could be the development of a list of simple, age-based competencies aligned with internationally recognized systems, such as TIMSS/PIRLS and PISA. Digitized lists of such competencies could be made available to education providers, teachers and parents, and could be linked to existing digital resources and simple assessments (World Bank, 2016, p. 11). This list could be extended by building an open digital/mobile badge system that measures and acknowledges educational attainment across a range of digital and non-digital educational activities (Solve, 2016.). Digital or mobile badges are virtual symbols of achievement proving that a specific skill or competency has been acquired. An open badge system means that badges are awarded through different credible and trusted organizations, and learners can combine badges from different issuing agencies (Badge Alliance, n.d.). In crisis situations, education providers could issue badges following the completion of mobile or onsite learning courses. Once learners are resettled or when they move to a different site, the badges could serve as recognized digital proof of their prior educational achievements (Solve, 2016). Partnerships between public authorities and content providers should be established to ensure quality assurance and institutionalization of the badge systems.

Current technological developments, especially blockchains, can also play a role in the improvement of flexible and reliable educational data management systems in crisis settings. A blockchain – a decentralized digital database mechanism – holds a continuously growing, permanent and unmodifiable list of records. This distributed technology could help refugees prove their prior educational attainments and could contain other evidentiary documents, such as birth certificates and proof of citizenship, which would be accessible any time and anywhere.

One challenge closely related to certification is the way in which examinations are carried out. In some projects, examiners are flown into camp settings, or the examination is based on written essays that are corrected online. An interesting future route could be realized through digital certification mechanisms. The Duolingo language learning

app, although not created specifically for refugees, offers features for mobile testing and certification. Adaptive tests offered on the app can be completed on mobile or desktop devices with a stable internet connection. To prevent cheating, a remote proctor monitors each learner via video to ensure that unauthorized assistance is not obtained (Duolingo, 2014). Duolingo's approach illustrates how certification can be obtained through app-based testing services. However, challenges related to the recognition of identity documents need to be overcome. For example, in the case of Duolingo, of the ten countries where most refugees come from (UNHCR, 2016*b*, p. 16), only documents from Colombia are presently accepted to verify learners' identity (Duolingo, n.d.*a*). Furthermore, automated quizzes and adaptive tests are certainly not the only means by which higher-order reasoning or critical thinking skills can be assessed. Nevertheless, as mobile connectivity improves in refugee settings, mobile technology might also allow more systematic assessment and certification through oral exams conducted by voice-based telecommunications, breaking new ground and potentially saving financial resources when compared to the costs associated with in-person testing.

In this chapter, education system challenges and the potential of mobile learning to address them were explored. Emphasis was placed on three issues that have a substantial impact on education for refugees: teacher training and support, availability of educational materials, and documentation and certification of educational trajectories. The analysis explored how each of these three barriers affects education systems and inevitably cascades to individual learners. The interrelationships found among the various elements of the education experience for refugees suggest that approaches to removing barriers can indeed make use of mobile technology but also rely heavily on the willingness of people to innovate in ways that might be difficult to scale. Further, projects meant to support education systems in a manner that benefits refugee learners can still fail if they do not consider issues related to the diverse educational levels. The fourth chapter of this report will therefore engage with issues viewed through the lens of education levels, that is, primary and secondary education, vocational training, and higher education.
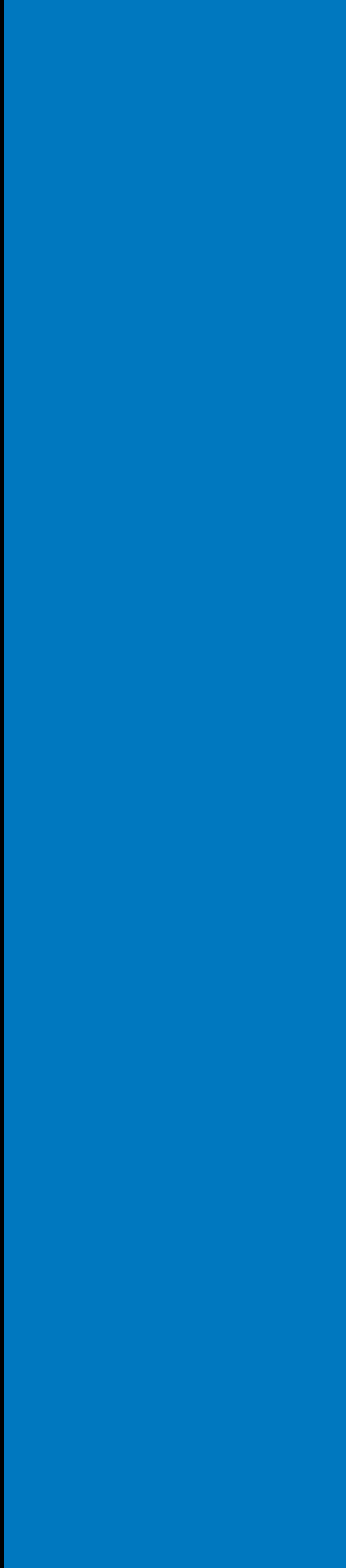
Mobile learning to address challenges related to specific levels and types of education

Mobile learning to address challenges related to specific levels and types of education

Refugee populations are quite heterogeneous in terms of age, socio-economic background, and prior education, training and work experience. Consequently, in addition to individual and system-related challenges, those working in the field of education for refugees might be confronted with issues specific to particular educational levels, such as:

- Limited access to quality primary and secondary education
- Obstacles to vocational training and the labour market
- Restricted access to higher education

Limited access to quality primary and secondary education

Challenges and educational implications

Access to quality primary and secondary education holds enormous relevance for refugees and displaced people. In addition to providing qualifications, schooling plays an important role in bringing back stabilized routines into refugees' disrupted lives. Both primary and secondary education produce high individual and social returns, especially in sub-Saharan Africa, Latin America and the Caribbean (Psacharopoulos and Patrinos, 2004, p. 114). In addition, the opportunity to access secondary education is a motivator for refugees to pursue primary education (Dryden-Peterson, 2011, p. 49).

> *Refugees' access to primary and secondary education is severely limited, with only 50 per cent of refugee children enrolled in primary schools, compared with a global average of over 90 per cent.*

Despite its relevance, access to primary and secondary education in crisis contexts is disrupted, restricted and uneven (Dryden-Peterson, 2015*b*, pp. 1–2). Recent reports estimate that only 50 per cent of refugee children worldwide are enrolled in primary schools, compared with a global enrolment rate of over 90 per cent (UNESCO, 2016, p. 106; UNHCR, 2016*d*, p. 4). For instance, it is estimated that at least two-thirds of the 700,000 school-age refugee children in Turkey, most of whom are Syrian, receive no formal education (Sirin and Rogers-Sirin, 2015;

Whewell, 2016). Enrolment is even more restricted for girls, refugee children in urban areas (Dryden-Peterson, 2011, p. 24; Sirin and Rogers-Sirin, 2015, p. I) and learners who intend to pursue secondary education (Dryden-Peterson, 2011, p. 24). Finally, about 75 per cent of all refugee adolescents aged 12 to 17 years are not enrolled in secondary school, compared with a global average of 17 per cent for adolescents of lower secondary school age (approximately 12 to 14 years old) (UNESCO and UNHCR, 2016).

> *Low attendance and poor quality of learning can be tied to financial, infrastructural, resource-related, sociocultural and pedagogical barriers.*

While access to education has become a priority on the agenda of many humanitarian actors, the quality of teaching and learning receives insufficient attention (Burde et al., 2015, p. 29). Even when refugee children are enrolled in schools, the quality of education tends to be low (Dryden-Peterson, 2011, p. 32). Although data on refugees' learning outcomes are limited, they are consistent in highlighting that refugees tend to have considerably lower levels of knowledge and skills than what is expected for their age (Dryden-Peterson, 2015*b*, p. 10) and are more likely to receive poor or failing grades and to drop out, as can be seen in the case of Syrian refugee children (Sirin and Rogers-Sirin, 2015, p. 1). Dryden-Peterson (2015*b*, pp. 10–11) reports that less than 6 per cent of Eritrean refugee children in Ethiopia had reached benchmarks of reading fluency by Grade 4. Low educational attainment seems to also be prevalent in higher income countries and tends to persist over time. For instance, the reading abilities of immigrants' children in OECD countries clearly lag behind those of children with non-immigrant heritage (OECD, 2012 p. 11).

Access to quality education is further hindered by challenges associated with the poor condition of learning environments in refugee contexts. In many instances, school buildings are not available, as a result of demolition or military and humanitarian occupation (Burde et al., 2015, p. 16). Such scarcity of schools is especially evident for secondary education (Dryden-Peterson, 2011, p. 50). Double shifting, that is, establishing two or more shifts for different cohorts of learners to make better use of available space, can additionally deteriorate the quality of learning, as it is often associated with reduced classroom

hours (World Bank, 2016, p. 11). Further, although schools can and should be major sources of security for students (UNHCR, 2016*d*, p. 10), many school environments are far from physically and emotionally safe, which poses yet another critical barrier to learning (Dryden-Peterson, 2015*a*) as well as integration (Ager and Strang, 2008, p. 184) across a wide range of settings. As schools are often seen as symbols of the ruling party, in conflict areas they are likely to be targets of opposing forces (Burde et al., 2015, p. 56).

Financial issues include not only fees and other school-related costs but very often the trade-off between education and securing the household's income.

In terms of financial barriers, low levels of school enrolment, especially in secondary schools, can be associated with high ancillary costs including transport, school materials and school fees (Burde et al., 2015, p. 16; Dryden-Peterson, 2011; UNICEF and Save the Children, 2012). Children, especially girls, often do not attend school because of opportunity costs such as the loss of household labour (Dryden-Peterson, 2011, p. 50). A lack of financial resources and the need to support the household's income were two of the main reasons cited by refugees in Jordan as to why their children were not attending school (UNHCR Innovation, 2016, p. 12). The tension between education and financial survival was also evident among Central American refugees in the USA, who struggled to attend high school while working intensively to secure their livelihoods (Suárez-Orozco, 1989). Teenage girls have an additional risk of dropping out of school due to early pregnancy or marriage, as shown in a study on Karen refugee groups in Thailand (Oh and van der Stouwe, 2008, pp. 601–2). In Australia, Karen refugee mothers encounter obstacles to meeting their own educational needs, such as learning the language of the host country, due to pressure to manage the household and care for children and elderly family members (Watkins et al., 2012, p. 132).

Political and legal restrictions further exacerbate issues related to primary and secondary education access.

Refugee children may also face legal restrictions to schooling in countries of first asylum. This phenomenon is particularly evident in countries that have not signed the 1951 Refugee Convention or its 1967 protocol. Under these circumstances, displaced persons often do not have the legal status of refugees and may be denied access to education (Dryden-Peterson, 2015*b*, p. 7). In addition, lack of fluency in the host country's language of instruction (see more details regarding language problems in section 2.1) can not only cause difficulty following teachers' explanations at school but also constitute an entrance barrier to enrolment. In high income countries such as the USA, school dropout of refugees and immigrants

is the consequence of additional factors, such as students' self-perception, rejection by peers, a lack of psychological and academic preparation prior to enrolment, and an absence of future goals (McBrien, 2005, pp. 343–44).

Given the number and extent of the barriers blocking access to primary and secondary education for refugees, it is worthwhile to explore ways in which mobile solutions can play a positive role in ensuring that all refugees have access to inclusive and equitable quality primary and secondary education.

Assumptions and evidence base

The underlying assumption of many current projects and initiatives is that mobile learning enables and broadens refugee children's access to primary and secondary education while enhancing the quality of learning and teaching. Also, some initiatives expect that mobile learning can compensate for the lack of formal education attained by out-of-school children.

The current evidence base does not confirm these assumptions. Most projects have not reached scale nor rigorously and systematically evaluated their impact on educational access and quality, and the limited evidence that has been gathered is inconclusive. Quantitative outcomes are mixed, while some qualitative evaluations point to positive effects, especially regarding connected and lifelong learning. However, even positive outcomes from pilot and short-term deployments that suggest heightened learner participation and gains in educational performance need to be viewed with caution, as some of these outcomes could be the result of the novelty effect of a new technology being introduced.

The question surrounding the cost-effectiveness of mobile-based solutions for the provision of primary and secondary education should also be acknowledged. It remains unclear whether digital technologies are the most cost-effective solution to enhance learning and teaching, or if similar outcomes can be achieved with other, less costly approaches.

Against this background, the next section applies a critical lens to mobile learning projects at the primary and secondary education levels to understand how, if at all, the integration of mobile tools positively impacts the provision of education for refugees.

Current practices and projects

The mobile learning interventions identified vary with respect to their educational designs. They include the use of mobile learning to enhance formal classroom instruction, non-formal mobile learning in community education centres, and location-independent provision of mobile content and tutoring.

Formal mobile learning in classrooms

Formal mobile learning involves the integration of mobile learning technologies, mainly devices preloaded with educational content and activities, into classroom teaching for refugees. The main objective of the mobile learning projects in this category is to compensate for the lack of textbooks and other educational materials available in education settings for refugees.

One of the largest programmes to address the shortage of educational resources is the **Instant Network School** programme, a joint initiative between UNHCR and Vodafone. For each target classroom, the programme provides a set of computer tablets, solar-powered batteries and a backup generator; a satellite or mobile network connection; a suite of preloaded content and online resources; and ongoing training of coaches and IT support staff (UNHCR Innovation, n.d.*e*). The programme, which also facilitates community learning, involves 30,000 students and 600 teachers in 20 primary and secondary schools in Kenya, the Democratic Republic of Congo, Tanzania and South Sudan (Vodafone, n.d.). Preliminary data analyses suggest increased levels of enrolment and retention in primary school settings (UNHCR Innovation, n.d.*e*), while a systematic external evaluation is scheduled for the near future (Strecker, 2017).

Ideas Box, which is geared towards strengthening refugees' access to informational, educational and cultural resources, is another initiative that was reported to have positive effects in school contexts (UNHCR Innovation, n.d.*d*). According to an evaluation in Burundi's refugee camps, students from primary and secondary levels had 23 per cent higher achievement in mathematics and French, on average, compared with control groups who attended their classes without using the Ideas Box. Additional qualitative analyses point to students' higher levels of engagement with instruction supported by the Ideas Box. The intervention group was taught with the Ideas Box using its resources, which include tablets, books, apps, videos and education portals (including Khan Academy and Wikipedia), as well as tables, stools and modular furniture (Peich, 2016). In the context of the Syrian refugee crisis, many more initiatives, such as **Learn Syria** or **Thaki**, have started collecting new or second-hand mobile technology, preloading it with educational resources and providing it to refugee learners.

However, the use of mobile and other technology has not led to positive results in all settings. An approach similar to the Instant Network School programme was deployed in two Malaysian refugee learning centres. Although students and teachers enthusiastically used the tablets and curricular materials, standardized tests did not show evidence of increased academic performance that could be attributed to this use. In addition, although the cost for the procurement

of reading materials decreased, the overall project costs exceeded these savings (UNHCR Innovation, n.d.*b*).

Non-formal mobile learning in education centres

Mobile technology is also being used to enable and support non-formal learning outside classroom settings, in places such as community or education centres. In these environments, tutors typically guide learners with the goal of bringing them back to formal school learning or helping them stay in school. Some projects explicitly focus on skills development and subjects relevant to primary and secondary education.

The **E-learning Sudan** project supports out-of-school children in community centres in Sudan by assisting with their mathematical skills development. Through this initiative, children aged 7 to 9 use a self-paced, guided educational game on solar-powered tablets each day for approximately 45 minutes. A quasi-experimental study design – which evaluated the project and the participation of more than 500 children through mathematical tests, logged data and the Early Grade Mathematics Assessment (EGMA) – found that the children improved their mathematical abilities significantly by playing the game, although most only played two to three days a week. No differences were found with regard to gender (Stubbé, Badri et al., 2016; Stubbé, van der Klauw et al., 2016). In the last four years, the project has increased the number of programme beneficiaries from 66 to 589 in Sudan and has plans to scale up with the goal to reach thousands more in Sudan and in the Middle East (War Child Holland, 2016).

Non-formal mobile and connected learning can help refugees both stay in and return to school. It can also offer them a new vision for their prospective career path and help make them leaders in their local environment.

The **Raspberry Pi for Learning (Pi4L)** project provides flexible non-formal learning to children not enrolled in formal education. The goal is help them develop basic numeracy, science and coding skills. Raspberry Pi is a tiny computer (about the size of a credit card) that can be connected to peripheral devices, such as a keyboard and a computer screen. The project has been piloted in Lebanese community centres with 300 children who are not enrolled in formal schooling (UNHCR-UNDP Joint Secretariat, 2015). A unique feature of the project is the coding element: using the popular visual language Scratch, children learn the basics of computer programming. Learning to code is not only a goal by itself but also a means to practise other subjects such as mathematics, science and art (UNICEF Innovation, 2014).

In contrast to some other projects in this section that mainly target out-of-school learners, the **TIGER (These Inspiring Girls Enjoy Reading) Girls** programme works mainly with secondary school girls in the Jordanian Zaatari camp with

the goal of keeping them in school. It also aims to facilitate the girls' lifelong learning and personal and professional development. Learning is organized in small teams of about ten girls who meet daily in community learning centres. With the support of coaches in the refugee camp, girls can access open and personalized reading, mathematics and civics learning resources on low-cost digital tablets, rate the resources and track their progress on their dashboard. Since the coach can review the progress of her team, she can pair weaker and stronger learners and support learners in topics they are struggling with. The Open Learning Exchange system, called Planet Learning, encourages the creation of local content by the girls and their coaches. In addition to academic learning, the girls engage in community development projects to create solutions to problems in their camp environments (Belfer Center for Science and International Affairs, 2016; Rowe, 2016).

The overarching goal of the Tiger Girls programme is to help Syrian adolescent refugee girls develop a greater sense of personal power, meaning and connections in their lives with a vision for their future as productive and thriving adults. An interim, qualitative evaluation of the pilot with approximately 120 girls and 12 coaches found that the programme increased the girls' confidence and motivation to stay in school (Phimister, 2016) and that it drew some of out-of-school adolescent girls back into school (Rowe, 2016). Furthermore, the evaluation highlighted the development of new collaborative problem-solving skill sets and stronger social networks among peers, and between peers and facilitators (Phimister, 2016).

Though the above findings from non-formal education contexts are promising, none of the programmes examined have reached scale, and a large portion of the evidence base of positive impact relies on qualitative data that have not been corroborated with quantitative evidence to strengthen the findings. The last primary and secondary education context to be considered in the next section concerns interventions that are location-independent and open up endless possibilities as to where learning can occur for refugees.

Location-independent mobile content and tutoring

Sometimes, teaching and learning in refugee situations can occur in non-traditional locations outside of classrooms and community learning centres. Location-independent mobile learning opportunities, which are not tied to any kind of onsite support, can provide a high level of flexibility in terms of when and where educational experiences happen, freeing teachers and learners from traditional structures that may prevent their needs from being met. However, the number of projects implemented in this category has been relatively limited.

Integrated SMS approaches could offer valuable supplementary learning and formative assessment mechanisms, but their effectiveness remains to be demonstrated through rigorous evaluations.

The only example identified is Eneza's Short Message Service **Shupavu291**, a collaboration between UNHCR, Eneza Education, Lutheran World Federation and the Xavier Project, implemented in Kenya's Dadaab refugee camps (UNHCR, 2016c). The SMS content is aligned with the Kenyan primary national examination and provides students with access to study materials for all primary subjects, like English, mathematics, Kiswahili, science, social studies, general knowledge and religion. It is presented in the form of mini-lessons and subject- and topic-specific quizzes. For each submitted answer, learners receive corrections and an explanation of the solution to deepen their understanding. The tool also allows live Wikipedia searches and provides an Ask-a-Teacher feature, which learners can use to direct questions to qualified teachers and receive their responses via SMS. The service is being piloted in the Hagadera camp with 1,000 learners who can use the content for free for one year (UNHCR, 2016c; Xavier Project, n.d.).

The focus on SMS technologies allows projects of this type to leverage learners' mobile phone ownership to realize a bring-your-own-device (BYOD) approach. BYOD initiatives that use simple technologies can help considerably simplify upscaling efforts. The depth of knowledge acquisition possible via short messages and questions is clearly limited, especially with respect to the development of creativity and problem-solving skills, but such approaches are nonetheless complementary to schooling. They can also be a viable route for formative evaluation, especially if the aggregate findings generated for teachers enables them to understand students' strengths and challenges.

Reflections and emerging practice

With the exception of the Instant Network School programme, mobile learning initiatives for primary and secondary education in refugee contexts have not yet reached scale. Nevertheless, the emerging experience shows that mobile learning designs can address some of the educational demands of refugees both inside and outside of school environments.

The most obvious need that projects in this category face is access to core and complementary learning materials for learners and teachers. The management of highly diverse levels of prior knowledge could be addressed by facilitating self-guided and inquiry-based learning mediated by mobile technology. However, one of the main obstacles is that teachers tend to adhere to transmission-centred teaching

styles. In this sense, teachers sometimes use tablets and projectors as substitutes for the blackboard, without embracing child-centred pedagogies and exploratory learning methods, as has been observed in the Instant Network School programme (UNHCR Innovation, n.d.*e*). The initial reluctance to change required considerable levels of teacher training and support to enable a gradual transition away from transmission-based instruction to the facilitation of students' dynamic, self-guided learning, in order to make the most of mobile solutions. The Instant Network School programme trained dedicated coaches from the community to support the teachers in their work with the tablets (Strecker, 2017; UNHCR Innovation, n.d.*e*).

Many of the projects in informal and formal learning settings use tools adapted to the challenging situation in crisis and camp environments. These include offline content to prepare for a lack of connectivity; robust hardware or cases to better protect devices from dirt, dust and blows; and solar-powered systems to account for power shortages. The need for infrastructure other than technology is addressed by projects such as Instant Network Schools or Ideas Box, which also provide light furniture. However, particularly in the scaling-up phases, the procurement of infrastructure and technology was found to be a time-consuming exercise that constrained implementing agencies' operations (UNHCR Innovation, n.d.*e*). An important aspect for consideration is the way in which technology fits into the overall educational needs ecosystem. Well-designed technology can work in crisis situations with a lack of educational resources, but it requires motivated teachers on the ground. It has been argued that technology cannot make teachers return to their schools, nor can it compensate for their absence in the classroom. In this respect, even the most innovative technological education approaches cannot surmount issues that arise from deeply embedded political and social problems (van Reijswoud, 2014).

Although some reports about individual projects highlight the positive learning impacts that resulted from the interventions, the scientific underpinning is weak. More rigorous and longitudinal studies are needed to corroborate the positive and largely qualitative educational impacts observed in some projects. Future evaluations should also investigate cost-effectiveness, especially when interventions carry high implementation and maintenance costs. For example, Hughes (2014) asserts that 'even at half the current cost, one [Ideas] Box would still be more than twice as expensive as building a modern primary school in Africa'. A further issue related to the technology costs involved with mobile learning interventions in primary and secondary education is the secure storage of equipment. In Uganda, for instance, to protect one project's technology equipment against vandalism and theft, it needed to be locked away in distant rooms, giving educators and caregivers only limited opportunities to prepare for lessons (Jeong, 2015).

The project implementation costs of mobile learning interventions in primary and secondary education are extremely high. Future research urgently needs to address issues of cost-effectiveness for the use of limited resources.

Finally, most of the projects reported in this section are aimed at refugee learners in camps and rural areas. While this is certainly a relevant target group, limited digital learning opportunities have been made available to refugees who live in urban and semi-urban areas and attend regular schools in their host countries, even though this group constitutes the majority of the refugee population.

A learner's perspective

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Rima[2] is a Syrian girl in Jordan's Zaatari camp, a setting marked by high secondary school dropout rates for adolescent girls. As a participant in the TIGER Girls programme, she has joined a group of young girls who are being mentored by a female coach. The use of open-source digital libraries on tablets supports the girls' formal education as well as their engagement in community-based learning projects.

Rima is a 13-year-old girl from the As-Suwayda Governorate of south-eastern Syria. She grew up with her family on a small farm, but when her father was drawn into the civil war, her mother fled with her and her younger brother to the safety of the UNHCR camp in Zaatari, Jordan. The situation of Rima's family is common among Syrian refugees. Of the hundreds of thousands of Syrian refugee families in Egypt, Lebanon, Iraq, Jordan and Turkey, it is estimated that one in four is headed by a woman who struggles alone for her survival and that of her children (UNHCR, 2014).

Today, Rima lives with her mother and brother in a crowded caravan with the family of Rima's uncle. Due to the spreading civil war, Rima had been out of school for nearly a year, but in Zaatari she enrolled in a camp school. Although she likes going to school, the classes are overcrowded and she has to share the textbooks with her schoolmates. The situation is particularly difficult for adolescent girls. Many drop out because they need to help at home or as a result of early marriage (Education Sector Working Group, 2014). Rima

2   The photos portray TIGER Girls participants, but to protect the privacy of the girls, the narrative of 'Rima' is a composite of experiences that the girls have experienced and are continuing to experience, extracted through qualitative interviews in the Zaatari refugee camp in Jordan.

recalls the example of a 14-year-old friend, for whom marriage was arranged last month:

'She had to marry an older man who wanted someone to care for him. She left school and I've hardly met her since then.'

Soon after their arrival, Rima heard about the TIGER Girls programme, and with her mother's encouragement she became a TIGER. She now meets her new friends and Nawar, her facilitator, every afternoon in the community centre to study and prepare for school. Rima accesses her multimedia library with digital courses and reading materials on a tablet, and when she has a question she discusses it with the other girls and the facilitator.

Rima particularly likes to work in the TIGER Girls community programmes. In addition to academic learning, the girls engage in practical, solutions-based community work. They identify an issue in their neighbourhood, devise a solution and propose it to community leaders to gain their support. Then they implement the solution, reflect on what they have achieved and present the results in a community meeting. Smiling, she reminisces about one of the projects she is particularly proud of, which involved recycling:

'We used recycled materials to make a mural and to create arts and crafts, and we organized a debate about how to better protect our environment. We worked really hard on this. Before the debate, I used my tablet to learn about recycling and made a lot of notes. We also got advice from our coach. I saved my best arguments for the actual event.'

During the debate, Rima's mother was in the audience. Seeing her daughter's performance moved her deeply: 'I became so proud seeing my daughter so strong and confident on the stage. It has moved me to tears', she recalls.

Recently, Rima has expressed interest in learning more about child health and development. In part, this has happened because of the time she spends taking care of her uncle's small children.

'I really enjoy taking care of my little cousins, and I think I want to be a paediatrician when I grow up. I want to be a mother myself. But I want to be more than that.'

The coaches in the TIGER Girls project counsel and support the girls in moving towards higher education and professional career pathways. The girls learn about future career possibilities by studying information on their tablets. In Rima's case, the coach has arranged for her to spend one afternoon after school each week volunteering with one of the paediatricians in the camp's health clinic. The project has helped the girls to envision their future lives. Almost all of them have a career in mind, citing aspirations to become lawyers, engineers, clothing designers, doctors, teachers and coaches.

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Obstacles to vocational training and the labour market

Scope of the challenge and educational implications

Supporting refugees' prompt access to employment through vocational qualification measures is crucial, not only because it can help secure their material and financial survival, but also because it offers new perspectives and stability in shattered lives.

Technical and vocational skills development programmes can provide new chances to refugees who experience disrupted primary education (Dryden-Peterson, 2011) and are of particular relevance to young people in camp situations, which are marked by extensive periods of downtime and loss of a sense of purpose (Zeus, 2011, p. 261).

Very limited skill sets reduce self-entrepreneurship and access to the labour market.

For example, a study on Eritrean refugees in Ethiopia reveals that 72 per cent of youth indicated not having worked in the past thirty days (Samuel Hall Consulting, 2014, p. 6). The same study finds that despite high levels of literacy, refugees' limited skill set and basic educational background inhibit self-entrepreneurship and access to the labour market (Samuel Hall Consulting, 2014, p. 5). Vocational skills training can show young people a way out of boredom in camps and provide them with a route to a productive life in their future host or home country settings (Lyby, 2001). Another group with a particular need for occupational skills in camp situations are women, who in war- and crisis-affected areas often become the breadwinners for their households. For example, one out of four Syrian refugee families in Egypt, Lebanon, Iraq and Jordan is headed by a woman alone (UNHCR, 2014).

Despite the high relevance of developing job-related skills, expenditures for vocational training comprised just over 20 per cent of the UNHCR's 2012 budget for post-primary education (US$10 million), with an additional US$7 million provided for vocational scholarships (UNHCR, 2011c, cited in Dryden-Peterson, 2011, p. 51). One of the challenges is that the need for technical equipment can make vocational training more expensive, per refugee, than secondary education (Dryden-Peterson, 2011, p. 52). In addition, although existing training programmes have turned out to meet the demands of local markets, they have also caused oversaturation in certain professions because of limited business opportunities (Dryden-Peterson, 2011; Moberg et al., 2009).

Structural hurdles and a lack of information prevent refugees from accessing training and entering urban labour markets, often forcing them into idleness or exploitative informal economies.

There is also a demand for programmes aimed at updating occupation-specific skills for refugees and immigrants in urban settings to prevent unemployment and occupational downward mobility (Krahn et al., 2000; Shah and Burke, 2005; UNESCO, 2016). In addition to qualifications, a common employment hurdle is a lack of knowledge about urban labour market opportunities (Samuel Hall Consulting, 2014) and their associated rules and regulations. Refugees, displaced persons and immigrants require knowledge about the functioning of the labour market, including an understanding of industrial relations law and negotiation skills (Shah and Burke, 2005, pp. 1, 25). In particular, workers in the informal economy face a high risk of exploitation, calling for not only employment services but also programmes that raise awareness of worker protections (UNESCO, 2016, p. 114).

Rules and regulations that do not recognize refugees' prior qualifications also prevent them from accessing training and employment (Krahn et al., 2000, p. 82; Samuel Hall Consulting, 2014; Shah and Burke, 2005). For example, lengthy asylum procedures have been criticized for driving numerous motivated asylum seekers in Germany to idleness, while early access to education and training would stimulate integration in many segments of the labour market (Morris-Lange and Brands, 2016, p. 11). A study on Eritrean refugees in Ethiopia determined that the lack of work permits and the requirement to have an Ethiopian guarantor are some of the main barriers to accessing urban labour markets (Samuel Hall Consulting, 2014).

Any potential support that mobile learning might provide to refugees in terms of skills development and labour market participation could have significant positive implications. Accordingly, it is helpful to understand the underlying assumptions, evidence base and existing programmes that shape mobile learning initiatives in the area of vocational training and the labour market.

Assumptions and evidence base

An increasing number of studies demonstrate the rich pedagogical opportunities for mobile media to support learning for, through and in the process of work (Pachler et al., 2011; Pimmer and Pachler, 2014). In crisis and refugee contexts, however, there has been much less debate on the potential of mobile media to enhance refugees' vocational training or to broaden their access to the labour market.

The evidence found in this report does little to redress this imbalance. Although the relevance of vocational training for

refugees has been emphasized for a long time (Lyby, 2001), the role that mobile solutions can play in this area remains underexplored. Some qualitative studies indicate that mobile media act as key instruments for refugees and immigrants from low-resource settings as they seek and realize work opportunities, thus contributing to their participation in the labour market. Some of the examples also illustrate how digital and mobile devices can facilitate niche opportunities for refugees to pursue mobile-based employment, allowing them to circumvent hurdles that prevent them from entering local labour markets. However, such examples are scant in number and do not address challenges such as down-skilling or refugees' poor access to local economies.

An increasing number of programmes and initiatives help refugees acquire coding and digital skills with the goal of equipping them with competencies relevant for local or global labour markets. While this is certainly an interesting approach, the effectiveness of such programmes remains to be seen and should be subject to systematic evaluation in the future.

Current practices and projects

Mobile-based solutions for participation in the labour market

Mobile phones are among the most important items for refugees and can become useful tools during resettlement. When it comes to seeking employment, for instance, phones can be used for job searches. A small-scale qualitative study with refugees and asylum seekers in Australia found that the use of specific apps helped refugees and asylum seekers find temporary employment (Almohamed and Vyas, 2016, p. 167).

In some refugee contexts, mobile phones are a relevant tool to seek and realize impromptu work opportunities.

In addition, mobile phones are key instruments for realizing ad hoc work opportunities in a variety of contexts, for example among Zimbabwean immigrants in Botswana (Kim et al., 2013, p. 153), or among Latin American refugees and immigrants in the USA (Pérez-Mendoza, 2015, p. 80). A study of South African refugees found that mobile phone use had a strong effect on their participation in the labour market, with phones serving as resources to search for employment and generate income (Bacishoga and Johnston, 2013).

The creation of mobile-based opportunities might also constitute a 'gig economy' for refugees. This includes forms of digital work that are being created as a means to help refugees gain legal employment by connecting them to people online, regardless of their location, and allowing them to offer services in exchange for payment.

An example of this is the **NaTakallam** ('we speak' in Arabic) platform, where refugees can work as language teachers. As interest in Arabic language learning has grown, more people seek flexible learning opportunities to learn or practise the language. NaTakallam harnesses the largely untapped skill sets of well-qualified Syrian refugees to act as conversation partners and, in an informal sense, as language teachers. The model is to pair Syrian refugees in Lebanon, Egypt, Germany, France and the Turkish city of Gaziantep with online Arabic language learners from an English-speaking background across the world (Rifai, 2016). The service is meant as an informal, colloquial learning activity to complement more formal language courses (Robins-Early, 2015). The pairing of learners and teachers is grounded in common interests or educational backgrounds (Rifai, 2016), and as a result the development of new friendships has even been observed (Robins-Early, 2015). One of the advantages of this form of telework is that no work permits are needed for refugees to get a job with the company because the assignment is conducted at a distance and online, through Skype. The simplicity of the service attracts teachers and learners and provides a win-win situation: refugees are able to earn a livelihood, and learners can enhance their Arabic skills in an affordable way (Sara, 2017).

Operating in the Dadaab camp in Kenya, **Samasource** is a non-profit organization that provides refugees with skills training through a microwork concept. Refugees are first trained in areas of digital literacy including hard skills, like how to use laptops and word-processing software, and soft skills, like demonstrating professional behaviour online. The refugees eventually apply their newly acquired skills to small tasks like data entry for clients such as Google, CISCO, Yahoo and eBay. Samasource says that trainees have the potential to quadruple their earnings (from US$2.20 a day before becoming a microworker) (Samasource, n.d.). For a refugee, this would represent a substantial influx of income to support their integration into host country societies. However, although Samasource trained ninety refugees in the Dadaab camp, it struggled with operational and structural difficulties that eventually put them out of work (Hegarty, 2011).

Mobile training and upskilling opportunities

Despite promising mobile learning cases from other areas of vocational training, little is known about this domain in refugee contexts. Vocational and practical skills are at the centre of **Jesuit Worldwide Learning's community service learning tracks**. Strengthening communities is deemed central, as the community is one of the first assets that refugees lose upon displacement. During six-month training programmes in diverse areas including health care and psychosocial case management, around 25 per cent of the learning is accomplished virtually in computer labs in community learning centres. Depending on connectivity and other infrastructure issues, the digital content is accessed offline or online through a learning management system. The digital learning activities focus on the development of domain-specific knowledge, whereas procedural knowledge (how to carry out specific tasks) and particular strategic knowledge (i.e. higher-order thinking skills) are primarily taught offline (Bonfini-Hotlosz, 2017).

InZone, which provides training for refugees to serve as amateur interpreters in crisis situations, is another example of vocational training. Its virtual learning environment (VLE) draws on social constructivist learning theory and applies problem-based learning approaches to teach both ethics and skills in consecutive interpreting in a humanitarian setting. In the framework of this initiative, which targets refugees living in Sudan and in the Kakuma refugee camp in Kenya, mobile phones are used so that interpreters-in-training can take photos of the notes they have taken during training. An evaluative study found that the integration of mobile components into the VLE contributed to peer learning enhancement in conflict zones, encouraged collaboration and allowed regular contact with expert trainers (Moser-Mercer et al., 2013). The course developers also modified interpreting instructions on the VLE to streamlined learning activities that would require only 20 minutes or less to complete. For this, a stable internet connection was required less frequently. However, it was acknowledged that adaptation and flexibility are key in circumstances where mobile connectivity can be interrupted at a moment's notice.

Although mobile learning could enhance vocational training of refugees directly in the workplace and help bridge school- and work-based learning, little evidence on existing initiatives is available.

An emerging trend for helping refugees enter the workforce in their host countries is to offer skills development programmes that focus on coding. Although the programmes target learners from various educational levels, the main goal of the mostly non-formal learning initiatives is to equip refugees with skill sets relevant to quickly accessing the labour market. For example, one of the largest events, **Refugee Code Week**, sought to decrease refugees' unemployment rates in the context of the Syrian refugee crisis by training participants with a type of technical know-how that is in increasingly high demand among employers. Given the tight work restrictions in local labour markets, refugees expected to acquire skills that would allow them to freelance for foreign companies abroad (Rainey, 2016). A collaboration between SAP, UNHCR and the Galway Education Centre, the event was implemented in October 2016 in the form of coding workshops in UNHCR camps, community centres and universities in Jordan, Egypt, Lebanon and Turkey, for around 10,000 participants (Rainey, 2016; Refugee Code Week, n.d.).

There are many other nascent coding initiatives and academies. While some are tied to higher and formal education, such as **Jamiya** (see also section 4.3.3.3), the majority provide non-formal education in the form of courses that span several weeks to a few months. Many examples, such as **CodeDoor**, **Refugees on Rails**, **Integrify** and **Hackyourfuture**, are from European contexts and include the provision of laptops and mobile technology to refugees.

Reflections and emerging practice

The projects shared in the previous section were developed in response to specific needs and challenges that refugees face when they wish to return to economic productivity after arriving in their host countries. Not only educational and skill-related shortcomings but also regulatory residence and movement restrictions can have a devastating impact on refugees' ability to participate in the economies of the countries where they seek asylum. Against this background, reports and studies find that refugees are using mobile apps that include job search functions. However, informal mobile learning networks are probably even more important for refugees, especially if the only jobs they can obtain are in the informal economy.

The mobile employment opportunities that have been conceived and undertaken illustrate that while many context-based challenges exist, mobile technology does have the potential to help refugees access job opportunities. While not a long-term solution, mobile jobs can help refugees earn a living and make a positive contribution in lives marked by stagnation and waiting. However, the scale of these initiatives is limited, the context in which they operate is challenging, and the nature of the jobs offered is provisional and represents occupational downward mobility for well-qualified refugees.

Despite the capacity of mobile learning to support vocational training and skills acquisition in refugee contexts, the knowledge base in this area is thin and warrants future exploration of its potential. For example, Vosloo (2017) argues that the flexibility of mobile technology can help learners access resources on the go and just-in-time in workplace settings, and allows them to record learning experiences and discuss them remotely with tutors. In so doing, mobile-based solutions help accomplish a relevant pedagogical function because they bridge the gap between learning in the workplace and education in the classroom (Pimmer and Pachler, 2014), allowing refugees to integrate work and learning.

The most prominent trend is certainly the provision of refugees with coding and IT skills using onsite and blended learning courses to equip them with skills demanded by the labour market. Although anecdotal information indicates that refugees found jobs after the completion of these courses (Rowsome, 2016), there is a clear demand for systematic evaluation regarding the effectiveness of such programmes. With respect to pedagogy, anecdotal evidence ties classic higher education approaches, which divide coding units into lecture and exercise phases, to decreasing participation of refugee learners. On the other hand, participation rates were maintained with experiential teaching designs that started with a trigger, such as a code segment showing how a certain problem was solved, followed by a phase in which small groups of two to three people, guided by tasks from the lecturer, experimented with the code (Kühl and Lehner, 2016).

A learner's perspective

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Ehab is a 24-year-old man from Homs, Syria. He escaped the civil war and now lives in Bielefeld, Germany. As a participant in Kiron's higher education political science degree programme, Ehab has gained new perspectives and an aspiration to use his skills to help rebuild Syria once the war ends.

Ehab holds an engineering diploma and started his civic engagement early on. He volunteered with the Syrian Arab Red Crescent during the war in Lebanon in 2006 and continued the engagement during the civil war in Syria. As the conflict worsened, Ehab decided to flee to the Ivory Coast in 2013. The outbreak of Ebola in West Africa in 2014 led to further movement, and he journeyed to Istanbul before settling in Germany. 'The arrival in Germany was challenging. I was put in a camp, there was no way for me to work, to continue my studies, or to contribute in any meaningful way. I was alone', he remembers.

For the duration of the flight and resettlement processes, he was unable to see the family he had to leave behind in Syria. He maintained contact with them through digital communication tools such as WhatsApp. Despite technical challenges, including poor internet connectivity in the conflict zone, he tries to communicate with his family every day. He also has not given up on his aspirations, and his experience fleeing his homeland helped spark his interest in political studies.

'The war made me change my interest. I believe that I can be more valuable for the society I am living in if I'm active in the political sector and part of the decision-making.'

Initially, it appeared impossible to start studies in Germany because of the language barrier. After acquiring French in

the Ivory Coast and Turkish in Istanbul, Ehab is now learning German by attending daily language courses. In order to matriculate at a German university, he needs to achieve a certain level of proficiency in the language. Because Ehab wanted to start immediately, he searched the internet for degree programmes in English, since he already had some proficiency in this language. Through this search, he came across Kiron.

Ehab started Kiron's online political science degree programme in March 2016, and to date he has successfully finished more than twenty courses offered through MOOCs. Early on, he built contact with the University of Applied Sciences in Bielefeld, one of Kiron's partner universities. Although he has not been officially admitted yet, Ehab regularly visits the university to supplement his MOOC-based learning experiences.

'I use the MOOC to get the online materials, PDFs and videos. But then I go to the university to discuss the topics with colleagues, lecturers and friends. This is how I learn.'

Ehab actively organizes onsite study groups with other refugees at the university by using WhatsApp and email. He notes that he is being supported by German students from the university in a few ways:

'They lend their books, answer my questions, and we can discuss the study topics.'

Ehab feels overwhelmed by the many languages he needs to master. The language of his new life is German, he speaks Arabic with his friends and family back home, and the online materials for his studies are in English. This can be confusing at times, and he wishes that MOOCs and online courses were available in German so that he could practise this language further.

The most challenging educational hurdle that Ehab must confront at present is bureaucratic in nature:

'I worry about whether the university will finally accept my Syrian A-level certificate and let me complete the on-campus phase for the political studies programme. I might end up studying online for two years without earning a degree.'

Throughout these struggles, Ehab has displayed high levels of resilience. Kiron has provided him with new perspectives and hope for realizing his personal goals. His biggest wish is to return to Syria and use his skills to help rebuild the country. He firmly believes that education is one of the most important catalysts in this process. While he waits to make his return, Ehab has started the project Syrian Youth Assembly in cooperation with the United Nations. Drawing on the developed Syrian Youth Statement, the coalition is currently coordinating the involvement of young Syrians in the peace talks in Geneva. In this way, the education that he receives has helped Ehab to become a political activist who now seeks to contribute to the creation of stability and peace in his country of origin.

Restricted access to higher education

Scope of the challenge and educational implications

Higher education in refugee and crisis contexts is pivotal for many reasons, perhaps most notably because highly educated refugees can help bring about social and economic development in their host and home communities and can make significant contributions to stability and peace (UNHCR, 2016*d*, p. 30).

> *Refugees' access to higher education is severely constrained, with enrolment rates of only about 1 per cent compared with 34 per cent globally.*

However, despite the importance of higher education for refugee populations, access is extremely constrained. Although the number has to be interpreted cautiously (Gladwell et al., 2016*a*, p. 11), only about 1 per cent of refugees are enrolled in higher education programmes, compared with a global average of 34 per cent (UNHCR, 2016*d*). Higher education options are particularly limited in camps (Gladwell et al., 2016*a*, p. 13) and in protracted situations in which refugees are perceived to be only temporarily displaced and no priority is given to higher education measures (Zeus, 2011, p. 271). Due to movement restrictions in many camps, the higher education opportunities of university-ready students are confined to a few available NGO-based programmes and scholarship opportunities (Gladwell et al., 2016*a*). Additional limitations apply in settings in which the demand for primary and secondary education is not met (Dryden-Peterson, 2011, p. 52).

> *Refugees lack information about higher education opportunities available to them.*

One of the most basic entry-level challenges is a paucity of information services for refugees about higher education opportunities (Gladwell et al., 2016a, p. 12; Lorisika et al., 2015). The lack of reliable counselling and orientation services has been emphasized, for example, in the Syrian refugee crisis (Lorisika et al., 2015, p. 24), which has seen the emergence of an unparalleled number of university-ready refugees (Gladwell et al., 2016*a*, p. 6).

Further barriers to quality higher education for refugees are financial hurdles, which include costs associated with enrolment and studying (Gladwell et al., 2016*a*) as well as opportunity costs related to the need to secure the household's income (Lorisika et al., 2015). This is true across diverse contexts: in Germany for example, where university tuition is free of charge, low enrolment rates have been tied to costs related to studying, like learning materials and cost of living, which cannot be matched by the limited funding that refugees receive (Morris-Lange and Brands, 2016). Moreover, refugees' higher education chances are inhibited by regulatory and political barriers related to not having a formal place of residence, restrictions on their movement, and the fact that often they do not have recognized documentation with them (Lorisika et al., 2015; Morris-Lange and Brands, 2016).

> *Movement restrictions, financial hurdles, regulatory barriers, inadequate university support structures and language barriers are among the key challenges.*

Furthermore, refugees perceive university support systems as inadequate or non-existent, triggering feelings of discrimination in comparison with the host country and international students (Earnest et al., 2010). Also, gaps in skills and competencies, particularly related to language, need to be overcome (see section 2.1), and, from a curricular perspective, there is a limited choice of programmes geared towards the interests, employability and life perspectives of refugees (Lorisika et al., 2015, p. 24).

Even though online education can offer a wider range of opportunities, refugees tend to prefer on-campus learning. For example, more than 90 per cent of a cohort of Syrian refugees favoured onsite learning, whereas less than 10 per cent preferred online or blended courses as their main type of study (UNESCO, 2015*b*, p. 4). The issue is not only a lack of digital learning opportunities but also a lack of acceptance of online learning on the part of refugees (Lorisika et al., 2015).

In addition to the challenges identified above, refugees voiced a particular demand for full accredited degree programmes compared with other certificates and non-degree programmes (UNESCO, 2015*b*, p. 18). Meeting the higher education demands of refugees is undoubtedly a complex endeavour. Mobile mechanisms that can be tailored to meet the needs of as many refugees as possible in a specific context could help tertiary level initiatives targeted at these individuals to scale.

Assumptions and evidence base

In recent years, digital learning and in particular MOOCs have been at the centre of the educational debate, with some commentators likening MOOCs to a digital tsunami that threatens to sweep aside conventional university education (Boxall, 2012). Only recently has the debate extended to the examination of the potential of MOOCs to strengthen higher education opportunities for displaced populations, in the

hope that they can be used to scale up online learning in refugee and crisis situations.

The current evidence base suggests that the hopes for MOOCs are not yet justified. Many projects remain in the development phase and have not gone beyond proof of concept. The phenomenon of high dropout rates, a common feature in MOOCs, is amplified when these types of courses are offered in refugee and humanitarian settings. Scaling up a MOOC in such contexts is possible but should be clearly framed by the need to develop additional online and offline support mechanisms for learner engagement. It is not the size of the online courses but their pedagogical design and how deeply they are embedded in full degree programmes that will make a significant difference to education for refugees at the tertiary level.

Current practices and projects

The ways in which mobile learning can strengthen refugees' access to and success within higher education can be articulated around three main areas of focus: information and orientation about higher education opportunities, MOOCs, and short and bounded courses. To reflect a current trend, a distinction is made between MOOCs and more contained digital learning environments.

Information and orientation about higher education opportunities

An important need for refugees is the ability to obtain information about higher education opportunities. One of the few online approaches in this area is UNESCO's **Jami3ti Initiative**, a platform that hosts information about scholarships and other higher education and training opportunities (Jami3ti, n.d.*a*). Refugees and other vulnerable youth can register online by creating a profile that includes their educational information and interests. Statistical information about learners' needs can then be used by donors and higher education institutions to offer targeted courses, as users receive information about opportunities that match their profile. The project, whose primary goal is to provide better statistical information on the higher education needs of refugees in Jordan, is now open to all vulnerable groups and has been extended to Lebanon (Jami3ti, n.d.*a–b*).

The use of MOOCs to help refugees navigate into and within higher education is clearly on the rise. The **Academic Refugee Project** launched in October 2016 seeks to sensitize thousands of refugees across Europe to the value of higher education (MOOCs4inclusion, n.d.). In addition to information provision, the German project **Ready4Study** offers potential students a nationwide MOOC-based preparatory course to access higher education. The course, which has been piloted with 1,200 participants, provides information about higher education opportunities in Germany in parallel to

German language training. Based on their prior education, personal interests and other conditions, refugees develop concrete outputs such as a curriculum vitae and motivation letters. They also receive training to develop hard skills for successful integration into the higher education system. The problem-based course focuses on supporting learners in acquiring the competencies and language abilities expected of students in a German higher education environment. To address the diversity in learners' backgrounds, the mentored MOOC concept combines individual self-guided learning for knowledge and language acquisition with collaborative, task-oriented learning in small groups. The latter is case-based, which means that learners accompany fictional but realistic refugee personas in their transition into the German higher education system (Seyfarth and Bremer, 2016; Seyfarth et al., 2016). While approximately 300 learners completed the course, the curricular trajectory of increasingly complex study (and language skills) implied that even learners who dropped out were able to reflect on their individual skills gaps. Although the involvement of as many participants as possible is a key indicator of course success, supporting refugees in a process of reflecting on their own higher education readiness is also valuable, as it enables them to identify suitable next steps while also participating in a community of like-minded learners. In this sense, the course design acknowledges the potential for early learner dropout or part-time participation but still illustrates that gaining appreciation for learners who successfully begin or continue a higher education programme in Germany is, in itself, a valid learning goal for refugees, as it may empower them to acquire knowledge of other avenues for earning professional qualifications (Seyfarth, 2017).

In addition to formal platforms and systematic learning approaches, non-formal mobile and social media spaces support access to and progress in higher education, as a recent study on learners from the Dadaab camp settings in Kenya observed. It was found that mobile social media accessed on the learners' phones, such as Facebook and WhatsApp, play a crucial role in helping to raise awareness about tertiary education opportunities. These digital spaces are a key resource in refugees' pathways towards and in higher education, especially for female learners. The use of mobile social media extends local support structures and enables social and instrumental support including guidance, tutoring, writing support, exam preparation and even course selection (Dahya and Dryden-Peterson, 2016).

UNESCO's Jami3ti project in Jordan and the MOOC-based pilots in Europe illustrate different ways of using digital media to assist student transitions into and within higher education settings. Once made aware of the opportunities available to them in higher education, refugees have a desire to participate in courses, including those of the MOOC variety.

Massive open online courses

MOOCs are being used by education providers to help refugees on their pathway towards higher education, as well as to deliver higher education courses and programmes. Central MOOC providers have opened up off-the-shelf MOOCs for refugees to access higher education content. The main approach is to establish cooperation with NGOs working directly with refugees. One example of this is a partnership led by **Udacity**, a MOOC provider. Udacity announced a partnership with NGOs to provide 1,000 'nanodegree' scholarships to eligible refugees, starting with six locations in Germany (Shen, 2015). Another example is **Coursera**, which currently has twenty-four partners but is rapidly expanding its programme and provides administrative features, technical support, free access to courses for one year and a recommended course list. In a short time, about 500 refugees have enrolled in 1,964 classes, completed 386 courses and engaged in 9,500 learning hours (Ikonomou, 2016).

As the majority of digital higher education courses and particularly MOOCs offer career-relevant content in English, the inclusion of non-English speakers remains a key challenge. The non-profit Arabic-language MOOC platform **Edraak** has started to offer educational courses to disadvantaged populations and especially to refugees (Kanani, 2014). Another route forward can be the inclusion of subtitles in existing courses. For example, Coursera has started to develop courses with subtitles in languages such as Arabic, French and German, drawing on the support of 500 active translators in Arabic and more than 10,000 active translators in total (Ikonomou, 2016). However, the use of subtitles in refugee contexts still needs to be tested, and its effectiveness remains to be seen.

To support refugee learners, MOOCs are often complemented by an offline learning experience. This can include on-campus tutorials to deepen specific topics (Catholic University of Louvain, n.d.), or facilitated discussions such as the MOOC Camps developed through a partnership between Coursera and the US State Department. Through this programme, MOOCs are offered to communities with significant refugee populations and are supplemented by face-to-face discussions.

Examples of MOOCs that are complemented by an offline component include entire bachelor's degree programmes, as is the case with **Kiron**'s approach. Refugees gain credits by participating in off-the-shelf MOOCs offered by providers such as Coursera, **edX** and **Saylor Academy**. After a MOOC-based learning phase lasting up to two years, students can continue their degrees on-campus at one of twenty-seven partner universities in Germany, France, Turkey or Jordan. The goal is to enable refugees to complete the first two semesters of a bachelor's degree through MOOCs and allow them a smooth transition into higher education in their respective host

countries. As of September 2016, Kiron has registered about 2,000 full-time students, primarily from Syria, Afghanistan and Somalia (Kiron, n.d.*c*). These students are following one of five study tracks: business and economics, engineering, computer science, political sciences or social work (Kiron, n.d.*b*), mainly in Germany, Indonesia, Turkey and France. The project is still in the pilot phase, with the goal to move the first twenty students to the on-campus phase in 2017. A scaling-up phase is scheduled upon the accomplishment of the proof of concept in 2018. Insights from the first phase have led Kiron to considerably extend its online and offline student support structures (Greenaway et al., 2016).

> *Current MOOCs for refugee interventions are neither particularly massive or open, nor exclusively online. Rather, their key success factor is the provision of additional offline mentoring and support structures.*

While extended support and tutoring is relevant for refugees who access MOOCs in high income settings such as Europe, they are an absolute necessity in under-resourced contexts. In **InZone's MOOC projects**, a number of cultural, technical and linguistic issues needed to be addressed in order to leverage off-the-shelf MOOCs for Somali and Syrian refugees in urban and camp areas in Nairobi and Amman, and in the Dadaab, Kakuma and Zaatari camps (Moser-Mercer, 2014, 2016). Challenges include, for example, issues related to connectivity, cost, webcam-based registration and the readability of a large volume of content on small mobile phones (particularly unstructured web forum threads). Additionally, the learner-centred pedagogy and the need to generate new ideas presented challenges to refugee students because they were used to transmission-based instruction where they were not often given the opportunity to participate directly.

For the InZone projects, the use of MOOCs required workarounds and considerable levels of additional support from academics, the local UNHCR community services officer and the MOOC provider (Moser-Mercer, 2014, 2016). In the InZone multicentre MOOC study, a total of fifty-two refugee learners were organized into small groups of ten participants each. Onsite support was provided in the form of tutoring and peer interaction, which turned out to be the single most relevant success factor, especially for female refugee students in camp settings (Moser-Mercer, 2017). Onsite support was complemented by virtual support from mentors, peers and professors, using a bundle of tools such as Skype and WhatsApp. The support also included a translated vocabulary list with difficult words for Syrian refugees with limited English skills. Although virtual mentoring without face-to-face tutoring seemed to have no observable impact on student success rates (Moser-Mercer, 2016), the WhatsApp tutoring groups were an invaluable tool for connecting learners within and across the multiple cultural sites (Moser-

Mercer, 2017). The analysis also found that session-based MOOC approaches were more challenging than on-demand MOOCs (Moser-Mercer, 2016). In contrast to approaches in which ICT skills are developed separately and often prior to an actual online course, this project integrated the familiarization with technology into the overall course implementation methodology (Moser-Mercer et al., 2016).

The MOOC experience for refugees varies based on how the courses are structured. Nonetheless, participation remains driven by the opportunity to learn in ways that might otherwise be unavailable in the context where the learners are based. The next section elaborates on experiences with smaller, bounded mobile-facilitated courses in order to make comparisons and draw contrasts between MOOCs and courses with a more traditional format.

Smaller and bounded courses

In contrast to MOOCs, which take place in seemingly massive environments, courses in the style of more traditional higher education contexts can also be made available with the help of digital technology. Some providers, such as the **Jesuit Commons Higher Education at the Margins initiative**, offer full online degrees. This programme allowed thirty students from refugee camps in Kenya and Malawi to start an online diploma in liberal arts. Volunteer teaching staff in the USA act as instructors by providing online advice, helping with coursework and grading assignments (Dankova and Giner, 2011). As with InZone's MOOC pilot in Dadaab (Moser-Mercer, 2014), challenging technical conditions and learners' unfamiliarity with online environments required special technical assistance onsite. The flexibility in accessing the materials benefited learners trying to balance volunteer work, family responsibilities and other duties in camp life. Despite initial scepticism, learners' feedback indicated that the development of relationships among learners and between learners and teachers represented one of the most valued aspects of the programme. Mutual familiarization was further supported through the exchange of photographs and videos. Students in Malawi also reported increased self-esteem as a result of participation in the initiative (Dankova and Giner, 2011).

MOOCs and other digital materials enhanced by online and offline mentoring and peer support in smaller groups, which incorporate popular chat and instant messaging tools and are embedded in an overall curriculum leading towards certifications, can have a great value for refugees' higher education.

A blended learning example with dedicated onsite learning phases is being realized in the **Jamiya project**, which is currently piloting an IT course for refugees in Jordan. Although the project uses the MOOC platform Edraak,

the number of participants is confined to thirty (Jamiya press release, 2016), following the model of a small private online course (SPOC). In addition to the online engagement component made up of short videos, quizzes, readings, projects, homework and digital support, regular face-to-face tutoring is delivered in learning centre in Zaatari and Amman. Although the course languages are Arabic and English, students are encouraged to transfer gradually to English (Jamiya Project, n.d.).

In other initiatives, the campus component is even more substantial and the mobile learning part is seen primarily as a supplementary add-on, such as in the **Borderless Higher Education for Refugees (BHER)** project. This project provides refugees with tuition-free access to courses from partnering universities in different disciplines, with the goal of improving equitable delivery of quality education and enhancing the employability of course participants through portable certificates, diplomas and degrees. In addition to accessing computers in the learning centre, students are offered the opportunity to access learning materials, such as textbooks, videos or articles, on course management systems through the use of tablets. Like other projects, BHER provides specific support for learners with weak or low learning prerequisites, for example by granting them access to remedial courses, compensating transportation costs, and allowing students to repeat courses and rewrite assignments (Orgocka, 2017).

Reflections and emerging practice

The use of mobile-based solutions in higher education for refugees is widespread. Even in under-resourced settings, most of the projects enhance onsite education with the use of digital learning platforms and distance-based academic support (Gladwell et al., 2016*b*, p. 37). In these contexts, the use of digital media is particularly valued because it allows refugees to build global networks and engage with a wider learning community (Gladwell et al., 2016*b*, p. 46; Hollow, 2017).

Perhaps the most popular development in this field is the current increase of MOOCs for refugees. However, the characterization of massive, open and online courses does little to reflect the actual potential of digital media in refugee higher education. Although some of the current initiatives are scalable, many of the current refugee projects work with smaller cohorts, tend to support only certain subjects and are often supply-driven rather than demand-driven. Another restriction to the massive feature is the high dropout rate associated with MOOCs in traditional education settings (see, for example, Onah et al., 2014), which can be also observed in refugee learning contexts (Greenaway et al., 2016). Secondly, the open nature of MOOCs may be problematic in certain cases, as for some groups of refugees it is highly recommended to use closed spaces and even

aliases to protect users' identities. In addition, experiences with learners from low-resource settings show that they are often unable to make use of open discussion forums due to technical and language-related restrictions and connectivity (Moser-Mercer, 2017). Finally, although MOOCs are delivered online, many successful projects opt for blended learning approaches, with onsite tutoring and peer learning becoming key success factors. Face-to-face learning components can also be a relevant motivator for refugees who are, at least initially, sceptical about online learning (Lorisika et al., 2015) and who need the social aspects of learning to help them better integrate in their new host environments (Lorisika et al., 2015, p. 33).

These arguments reveal how the success of digital higher education courses in high and low income environments depends not so much on the use of massive digital spaces but rather on offline and online mentoring and support mechanisms. The need to develop additional online and offline pedagogical models around digital learning spaces is especially relevant in humanitarian contexts where high dropout rates would hurt vulnerable and discriminated populations anew, representing an ethically unacceptable practice (Moser-Mercer, 2014). For example, in response to the challenges with high dropout rates identified in the first cohort, Kiron has extended its service by offering significant local offline support, including study hubs in major cities, study buddies, psychological counselling, career mentors and English language support. In addition and as a complementary measure to the predominantly asynchronous MOOCs, Kiron has also integrated synchronous online tutoring, in which university lecturers volunteer to support refugee learners (Greenaway et al., 2016). Also, in a research study on refugee higher education programmes in low-resource environments, learners and facilitators pointed to the necessity of offline learning

sessions, especially because they provide the opportunity to clarify aspects that have not been understood in the online presentations (Gladwell et al., 2016b, pp. 37–38).

Another important success criterion is the integration of digital learning into overall programmes that guide refugees towards certifications and degrees. While in higher income countries it is easier for refugees to engage in onsite or blended learning degree programmes offered by accredited higher education providers, refugees in remote and low-resource contexts have far fewer chances. Additionally, some countries do not recognize the legitimacy of online learning (Gladwell et al., 2016b, p. 48). The Connected Learning Consortium is working to address this concern by forming a collaboration between established partners, including higher education institutions, that can provide accredited courses and degree programmes to refugees in under-resourced contexts. At the core of this consortium – which includes partners such as UNHCR, InZone, Australian Catholic University, the African Virtual University, the Borderless Higher Education for Refugee Project, and other institutions and organizations – is sharing information about the development of post-secondary blended learning degree programmes in refugee and crisis contexts using a mix of different mobile solutions to overcome time and geographical restrictions (UNHCR Innovation, n.d.c).

Also in high income countries, digital learning offers considerably less value to refugees if it is not part of a full degree programme. MOOC providers and their partner organizations need to cooperate with university partners to embed massive (and not so massive) online courses in full degree programmes to make them attractive to refugees. This was the case for Kiron, which adapted and changed its offer to modularized curricula in response to the low completion rates in their initial, single-MOOC-centred model (Greenaway et al., 2016).

It is clear that much remains to be done if educational opportunities are to be put within reach of all learners in refugee contexts. While mobile learning can be a conduit for numerous possibilities, poor and one-sided implementation approaches can negatively affect potential outcomes. Moving forward, expanding the evidence base of what works and what can be improved will be key to promoting education participation among refugees at all education levels.

Lessons learned and conclusions

Lessons learned and conclusions

This report has examined the evidence base and a large number of mobile learning projects and practices, with a view towards exploring how mobile solutions can enable and enhance refugees' access to equitable and inclusive quality education and lifelong learning opportunities. To reflect the complex and multifaceted nature of refugee-related educational issues, the projects selected for this review cover multiple levels and types of formal learning from early childhood to higher education as well as informal education, situated learning and real-life problem-solving activities. They include learning in urban and rural environments, in high and low income settings, and across different phases of refugees' trajectories from flight preparation to arrival and resettlement. With full recognition of the paramount importance of overcoming the primary challenge of low access to digital devices, internet connectivity and other essential resources, the report focuses on three categories of challenges faced by policy-makers and practitioners aiming to harness already available mobile devices, in order to enable quick responses to maintain or restore critical education and learning activities. Broadly, these three challenges include individual challenges faced by refugees, challenges related to education systems, and challenges related to specific levels and types of education.

Undoubtedly, there is no one-size-fits-all approach to mobile learning for refugees, as each initiative needs to be conceptualized on the basis of the unique needs of the user population, including consideration of age; education level; refugee phase/status; place of origin and current location; gender; prior skills; interests and education goals; living conditions; technology access (ownership and connectivity); and income. These diverse and complex conditions increase the difficulty of making robust evaluations across projects. However, the insights drawn from the examination of the evidence base of theoretical assumptions and lessons learned from practical projects can still shed light on the planning and implementation of mobile learning projects urgently needed to address challenges across the three categories.

Leveraging existing technology resources to deliver quick-response mobile learning while ensuring physical and cyber security

Refugees' need for education is urgent, and the response to this need cannot wait for better conditions to be in place. One of the effective strategies for delivering quick-response plans to restore critical education services is to leverage all existing resources, including the mobile devices widely available to refugees. The use of mobile applications or mobile learning programmes that can be quickly developed and deployed to optimize the use of existing devices and educational resources has been proved successful.

When refugees scatter in large urban areas, it is challenging for aid and education providers to locate and reach them. In dynamic contexts, such as upon arrival and during resettlement, refugees are not only overwhelmed with information but also sceptical of official institutions, as in their home countries these can be the main sources of repression and persecution. With its potential to forward and spread messages across trusted sources, digital and mobile social media channels can be leveraged to inform refugees of education-related opportunities and deliver digital learning and educational courses. Social media campaigns require collaboration with people trusted by refugees, including other refugees, volunteers, activists and NGOs on the ground. Mobile network operators and social media providers recommended by trusted acquaintances and networks are the critical partners to reach refugees.

Of note to this report is the emergence and systematic adoption of simple mobile social media tools and instant messaging services. Their use has been reported across a wide range of contexts including settings with limited technological and other infrastructure, particularly in higher education and teacher training. Such tools are essential in helping refugees navigate new and confusing contexts, reconnect with family and social networks, and engage in informal learning for real-world problem-solving. Furthermore, they are increasingly used to support learning practices in more formal education contexts – for instance to organize study groups to maintain ongoing learning progression – or to restore access to education in new contexts. Some projects harness the popularity of these tools to systematically embed them in educational programmes such as teacher training or MOOC settings, where they enable

conversational and situated learning in the form of mentoring, peer learning or the repetition and discussion of key learning messages. In this sense, mobile communication and instant messaging weave together various educational resources, learners and teachers across geographical and cultural boundaries in ways not possible before. Although these tools are not without costs and challenges, the advantage of leveraging and facilitating the use of pre-existing resources is underscored by their potential for scalability.

From a technological viewpoint, many of the principles that apply to other mobile learning contexts are also applicable to projects designed for refugees. These include the requirement to adopt standards for physical and cyber security, which involve strategies to protect devices from harsh conditions (heat, dust, humidity or blows) as well as measures to protect the privacy of refugees, including considerations of the trustworthiness of app providers, data encryption mechanisms and the locations of the servers on which data are stored.

Ensuring inclusion and gender equality in mobile learning projects for refugees

Discrimination against women, children and other vulnerable groups is a striking pattern across education settings for refugees. Although the use of mobile solutions as learning tools has the potential to democratize access to teaching and learning experiences for refugee populations, the design of ICT-enhanced education interventions often does not promote the inclusion of refugees with diverse abilities or backgrounds.

Gender disparities are a common occurrence that can be observed in access to mobile technologies, with refugee women often having fewer opportunities to use mobile phones, as shown in a study on Syrian refugees (Wall et al., 2017, p. 7). Participation in tertiary education is another striking example where a digital gender gap exists between refugee women and men. The exclusion of refugee women from higher education opportunities in digital spaces is a persistent challenge that ranges from refugee camps in low-resource environments (Dankova and Giner, 2011) to refugee cohorts in high income countries (Greenaway et al., 2016). In these instances, initial ICT access played an outsized and influential role in terms of the number of females registered for digital higher education courses. Ensuring inclusion and gender equality should start with closing the divides in access and ownership as well as gaps in the skills needed to adopt mobile solutions, which have subsequent effects on the ability to use technology for educational purposes. This report shows that once they were registered, women used the digital learning platforms just as much as men, and in some cases more

frequently than their male peers. Sensitizing all refugees about the opportunities available to them is another key component to facilitating the process of educational inclusion. Beyond awareness, disadvantaged groups need particular support to leverage mobile learning, such as providing childcare facilities to allow mothers to participate in education programmes that would otherwise be out of their reach.

Promoting blended learning for quality provision of education

The evidence base and many projects (e.g. the Jamiya project, Edraak, and the teacher training programme of Jesuits Worldwide Learning) examined in this report validate the mutually beneficial and magnifying relationship between mobile applications and human interventions in mobile learning. The in-depth integration of mobile learning with onsite and face-to-face human engagement emerges as a common trait of many successful initiatives in education for refugees. In primary and secondary education settings, learners often access digital mobile resources in classroom settings and are closely guided and supported by face-to-face educators and tutors. Even in tertiary education settings, where learners typically have higher levels of self-organization skills, onsite peer support is a success factor for many projects.

The scarcity of resources and the high geographical mobility of some refugees, as well as the scepticism towards technology-enhanced education, make blended learning approaches difficult to sustain for entire courses and curriculum. However, programmes could start with an onsite learning phase, to be gradually enhanced with and eventually replaced by online activities. In this way, adding mobile learning components to pre-existing face-to-face programmes can improve their sustainability. That said, this approach should avoid further excluding the most marginalized groups, such as those who may find travel to face-to-face learning centres difficult.

Massive open online courses, or MOOCs, are an interesting vehicle for delivering education to refugees, especially in higher education settings and if they lead towards certification and degrees. However, many examples in this report have shown that to be successful in refugee settings, especially in low and middle income contexts and rural camps, MOOCs require considerable adaptation. Ideally, mentored online and offline courses should include the provision of instructional materials, drawn from open content, digital quizzes and assessment tools, and possibly adapted in terms of language; integrated offline and online tutoring, mentoring and peer interaction; and support in smaller groups to facilitate conversational learning.

Empowering teachers to play pivotal roles in facilitating mobile learning and coaching refugees

Teachers are the key element in education for refugees. Future mobile learning initiatives should focus more explicitly on empowering and supporting teachers to facilitate mobile learning and support refugees' self-empowerment. While teacher training is a standard component of most of the mobile learning projects reviewed in this report, the quality and sustainability of this training should be enhanced. For learning initiatives to yield results, it is not sufficient to stop with explaining to teachers the technological functions of the devices and the types of content available in a digitally enhanced classroom. Only comprehensive training on the integration of mobile technologies and appropriate pedagogical methodologies, as well as necessary subject matter knowledge, can equip teachers with adequate initial skills to design and facilitate mobile learning practices. Effective mobile learning projects also require ongoing support to guide teachers to use learner-centred techniques to respond to the myriad challenges in coaching refugees' learning and self-empowerment activities. The transition from transmission-based instruction to facilitation needs to be managed with sensitivity, as it is likely to challenge the prior values and beliefs of both teachers and learners about what constitutes relevant learning in a changing context.

It is worthwhile to pay special attention to strategies for unleashing the potential of mobile learning to empower teachers in refugee settings. With the growing number of refugees worldwide, it is estimated that at least 20,000 additional teachers would be needed on a yearly basis to meet the demand (UNHCR, 2016*d*, p. 8). In light of this need, the findings of this report endorse the power of mobile media in helping teachers access training resources on demand and receive real-time support. Some findings from low-resource settings suggest that using simple solutions to train and support mobile teachers can have significant impact.

Overcoming barriers to practising learner-centred pedagogy

To promote the quality of education for refugees and to make the learning outcomes more relevant for jobs and social inclusion, learning and skills development need to move from information transmission approaches to learner-centred pedagogies, in which teachers motivate and facilitate learners to obtain skills more relevant to their needs, and develop critical and creative thinking and problem-solving skills as well as other higher-order thinking skills. According to many of the projects analysed, non-hierarchical and peer-to-peer learning

activities, as well as tasks which require learners' creativity and self-direction, seem to overwhelm refugees. The pedagogical approaches that are commonly used in host countries are often completely new to refugees and contradict their understanding of what constitutes good-quality teaching and learning in their home countries. An effective mobile learning programme often not only blends both technology and human interventions, but also includes varied pedagogical modes that are relevant to the actual contexts and responsive to learners' needs. Refugees from a background in which learning is almost exclusively determined and dominated by teachers might be disoriented by the multiple learning pathways of mobile learning that are designed based on personalized learning methodologies and collaborative digital learning environments.

A gradual process with appropriate methodologies is needed at the beginning to sensitize refugee learners to the new pedagogical practices and the cultural beliefs underlying the pedagogy. Wherever possible, mobile learning programmes should design and provide user-friendly support functions including navigation maps, step-by-step guidance and orientation sessions with a low threshold to help familiarize beginner learners with the new learning pathways.

Cultivating skills for jobs, self-fulfilment and entrepreneurship

Digitalization has been reorganizing both economic and public services with an unprecedented magnitude and in ways that have a profound impact on refugees' jobseeking, self-fulfilment and social inclusion. As this report has shown, refugees increasingly use mobile media to access online services and opportunities for jobs and entrepreneurship. The core skill sets most demanded by the digitalized economy and society comprise digital skills and other complementary cognitive skills and non-cognitive skills, ranging from literacy and numeracy to interpersonal skills, critical and innovative thinking, complex problem-solving and collaborative skills. A recent report released by the European Commission shows that digital skills are required in all types of jobs in the European Union (Curtarelli et al., 2017). This means that those who do not have digital skills will be economically and socially excluded. In higher education settings for refugees, for example, it has been noted that students with limited prior ICT experience require substantial initial and ongoing training on digital skills to avoid continued exclusion or marginalization (Gladwell et al., 2016*b*, p. 48).

In this respect, it is crucial for education and training systems to help refugees develop adequate digital skills. Digital skills are generally understood as a cumulative continuum of skills

needed to use digital devices, communication applications and networks to access and manage information, create and share content, communicate and collaborate, and solve problems for effective and creative self-fulfilment in life, learning, work and social activities. Entry-level digital skills, meaning basic functional skills to make rudimentary use of digital devices and online applications, have been recognized as part of a new type of literacy – digital literacy – necessary to effectively participate in life and work in the connected world. The intermediate level of the continuum covers skills required to make use of digital technologies in meaningful and beneficial ways. Further along the continuum are the higher-level skills that allow users to make use of digital technologies in empowering and transformative ways, including the advanced skills that form the basis of specialist ICT occupations and professions. As demonstrated by the exemplary projects in this report, digital skills development should be contextualized for refugees to address challenges they are facing in various circumstances.

Although many applications for refugees are developed by non-refugee programmers, some successful examples in this report point to the potential of refugees and former refugees to develop new digital and mobile solutions for their peers. Technology entrepreneurship opportunities in host settings as well as in some countries of origin like Syria are burgeoning (World Bank, 2016). Mobile learning programmes designed to develop refugees' professional and high-level digital skills, including the ability to code and programme, have demonstrated multiple effects. As this trend continues, it will likely encourage more youth to start entrepreneurial businesses, lead to more mobile solution designers from the local refugee communities, and improve the quality and relevance of mobile learning applications.

Shifting from a technocentric approach to need-centric and resource restructuring models

The level of implementation and use of mobile learning varies drastically in the projects analysed in this report. Broadly speaking, three main approaches have emerged: technocentric, integrated need-centric and resource restructuring.

The **technocentric approach** is deeply rooted in the belief that technology can act as a silver bullet to development problems, conceiving technology implementation as the most important part of the educational solution. Although these approaches have been widely criticized in education and development debates, they are still predominant in today's political reality. In refugee contexts, technocentric approaches are reflected in projects that are primarily focused

on the procurement of devices and the development software solutions. It is not to say that these models are without value, as they might aid refugees in self-guided learning and information retrieval processes. However, the sustainability of technocentric approaches as well as their potential to provide equal benefits to all learners need to be viewed with caution.

Projects that focus on accomplishing educational goals and individual self-fulfilment needs by considering and addressing a plethora of elements in the wider educational environment can be classified as taking an **integrated need-centric approach**. In refugee contexts, this would comprise initiatives that create and provide comprehensive measures including onsite learning and teacher support, transportation to facilities, support mechanisms for female learner participation, and/or educational pathways that lead refugees towards certification and degrees. In the integrated need-centric model, technology is just one piece of the overall puzzle. While some of the projects reviewed began in a technocentric fashion, most of the more established and successful initiatives have adopted more comprehensive approaches.

A third, emerging model could be described as a **resource restructuring approach**, in which initiatives do not develop new technology or applications but rather restructure pre-existing technology, educational resources and human resources to generate more innovative business models to address refugees' needs for education. One of the fundamental strategies of this approach is to leverage the power of mobile technology to locate and reorganize resources available in the nearby communities of the users. As an example of this approach, Kiron (see section 3.3) neither provides the MOOCs nor is in charge of the on-campus learning and teaching or accreditation, which remain the responsibilities of the university partners. However, Kiron's resource restructuring model has been significantly enhanced by developing additional support structures such as study hubs, buddy systems and additional synchronous online tutoring. The initiative has even started to close content gaps between off-the-shelf MOOCs and university requirements by developing new MOOCs together with their partners. The resource restructuring approach, often based on an integrated need-centric model, can be primarily adopted in environments where learning and teaching resources are available, but it shows less potential in resource-poor settings with limited technological and educational infrastructure. However, even in these environments, projects can incorporate brokering aspects into their education models, for instance by leveraging and embedding refugees' pre-existing communication practices in mobile instant messaging groups.

Based on the examination of the theoretical assumptions and the practical mobile learning solutions and projects, a human–organization–technology model can be suggested as a framework for mapping and assessing the value chain

of mobile learning initiatives that aim to address individual refugee's needs for learning and development as well as the institutional challenges of education systems in meeting refugees' needs. Refugees' needs for education and development should always be the trigger of the human–organization–technology programming cycle and the value chain of mobile learning for refugees. As demonstrated in this report, mobile learning can take an individual form when individual refugees take the initiative to use mobile technology to address different levels of needs. But the value of mobile learning will be enlarged when education systems and other institutional aid providers holistically adopt a need-centric approach to planning and implementing strategies and projects to meet the comprehensive needs. Each of the three factors in this model form part of a hierarchy of needs, from basic safety and socio-emotional well-being to higher education, employment and self-realization (see Figure 5). These needs are interdependent and cumulative, meaning that the response to the basic category of needs often constitutes the foundation for the higher-level individual practices and system-wide strategies. Unless disruptive

technology is adopted, the value of higher-level and comprehensive mobile learning models are often based on the innovative integration and restructuring of basic mobile learning apps and digital and human resources, as well as previously proven organization strategies.

Given the limited reach of this report, this model does not attempt to exhaust the effective strategies for using mobile learning to respond to refugees' needs. It is rather designed to provide a framework to facilitate the mapping of refugees' continuum of needs; the assessment of the extent to which education systems are meeting those needs; and the exploration of the role mobile learning can play in addressing needs that remain unmet. More importantly, the human–organization–technology model aims to provide an analytical framework to gain insights on the successful system-wide strategies underpinning effective projects as well as the programme gaps. It is also expected to help direct the way forward by shedding light on other hidden potentials of mobile learning that have not been unleashed by previous or ongoing projects.

Figure 5. A human–organization–technology model to map values of mobile learning for refugees

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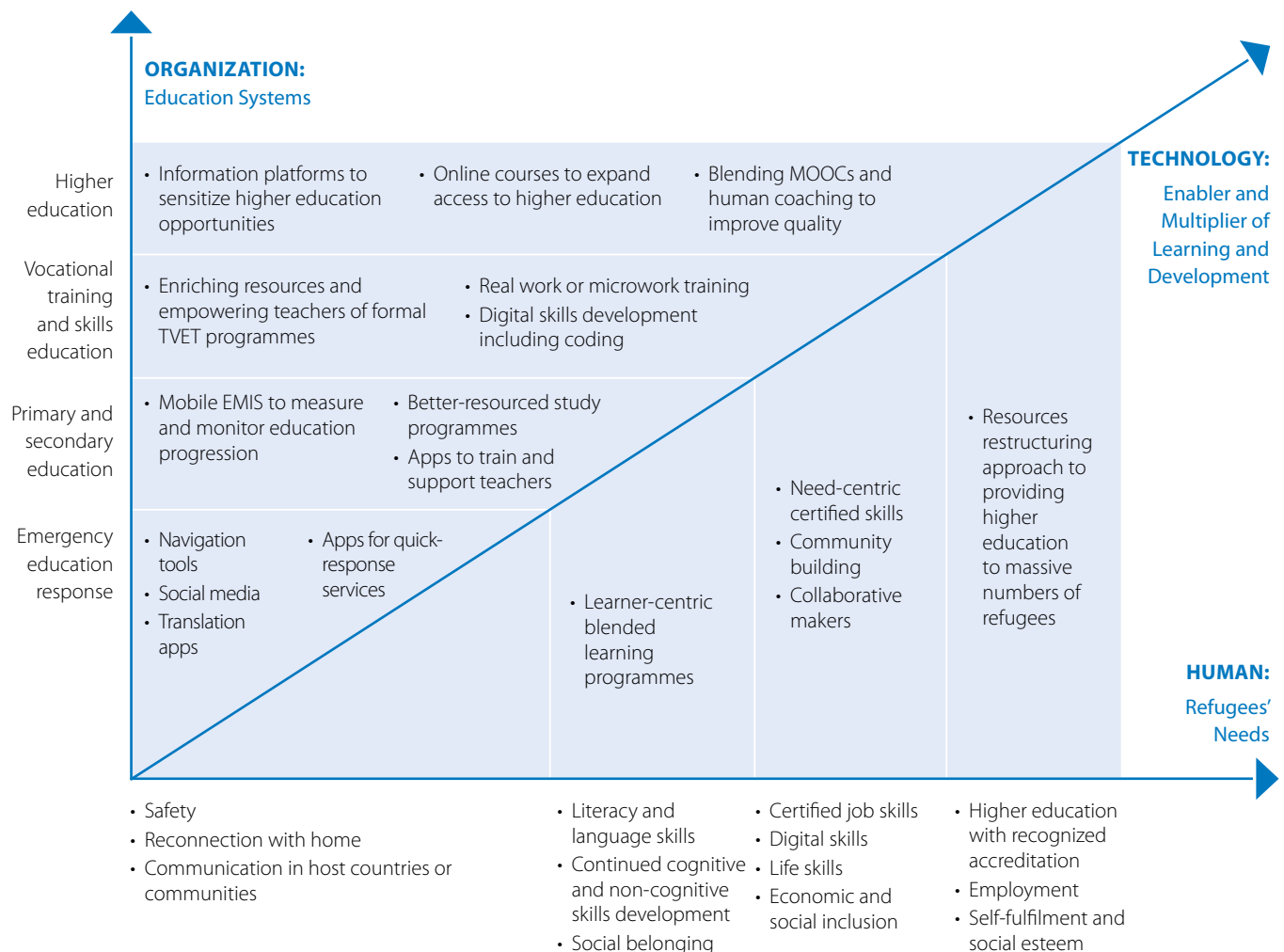
Major challenges and the way ahead

The continuing refugee and displacement dynamics and the increasingly central role that mobile media play in refugees' lives and learning necessitate further research. The findings of this report point to two major challenges that need to be addressed more systematically in the future.

Validating educational impact and determining cost-effectiveness

The findings of this report need to be further strengthened by more rigorous research studies to add substance to the weak evidence base in almost all of the areas identified, and particularly in formal and non-formal education settings. This requires a deeper qualitative understanding of the mechanisms and circumstances that help refugees learn or prevent them from doing so. In addition, randomized quantitative designs need to compare the educational outcomes of mobile learning with the outcomes of other learning formats.

The evaluation of cost effectiveness must accompany considerations of educational impact. Cost-effectiveness, which has been examined only to a limited extent in the studies and reports identified, is extremely critical, as some mobile learning solutions require high investments and costs. In other words, while the emerging evidence allows the conclusion that mobile learning contributes to addressing at least some of refugees' key challenges, it remains unclear whether it is more efficient than other strategies.

Scaling up and expanding reach

Almost all of the projects identified in this report have limited reach. Only a few initiatives involve large numbers of learners, and only a small fraction of refugee learners can benefit from existing programmes. Large projects have different dynamics in comparison to small pilots. Also, scaling up should not solely involve the distribution of devices, as technocentric designs with emphasis on the delivery of technology are unlikely to benefit refugees in equitable and sustainable ways. To this end, broad approaches that account for diverse sociocultural, political and financial aspects of refugee contexts need to be established in addition to the technological components. These approaches require collaboration and connections among stakeholders, sponsors and beneficiaries, leveraging existing resources and actors in the field through brokering models. While perhaps more time-consuming and resource-intensive, the ultimate goal of providing quality educational experiences to refugees is better achieved when stakeholders work in concert to realize educational opportunities for all.

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Appendix

Search strategies

The search strategy included three main approaches: (1) systematic and selective searches in academic databases, (2) selective web searches and (3) interviews. Peer-reviewed and journal articles are relevant as they present the most rigorously analysed evidence. In light of the limited number of research papers on formal mobile learning and refugee projects, the second approach has been invaluable, as it permitted the research team to include project experience not yet reviewed and documented in the form of research papers. Interviews allowed the consideration of even more recent and detailed on-the-ground project experiences not yet publicized on websites or in project reports, as well as the inclusion of experiences from subject matter experts.

a. Systematic searches in scientific databases: Web of Science; ERIC, PsycINFO and MEDLINE(R) (via Ovid)

Systematic and selective searches were carried out in the academic databases Web of Science, PsycINFO, ERIC and Google Scholar. To do justice to the interdisciplinary nature of the topic, the Ovid search interface was used to search articles from diverse databases including PsycINFO (4 million bibliographic records centred on psychology and behavioural and social sciences), MEDLINE(R) (23 million biomedicine and life science citations) and ERIC (1.5 million educational literature records). The Web of Science Core Collection was used to access contributions from 18,000 high-impact journals. For pragmatic reasons, the search focused on English articles. The main searches were carried out between August and October 2016. The searches combined search terms from three domains including (1) refugee and displacement contexts, (2) digital mobile technology and (3) education. One example from a Web of Science database search was:

 TS=(refuge* OR "asylum seeke*" OR immigran* OR migran* OR "people on the move" OR "displaced perso*" OR resettlement OR returnee* OR "stateless perso*") AND TS=(educat* OR learn* OR teach* OR lectur* OR traini* OR instruct* OR information OR knowled* OR supervi*, mento* OR "competence development" OR school* OR Universit* OR college*) AND TS=("mobile technolog*" OR "mobile phon*" OR smartphon* OR PDA* OR "tablet PC" OR "feature phon*" OR "cell phon*" or phon*) NOT TS="digital immigran*"

b. Selective searches in Google Scholar (using the above search terms)

In addition, Google Scholar was searched using selective search approaches, because this database was estimated to cover 100 out of 114 million English-language scholarly documents (Khabsa and Giles, 2014). Importantly, the searches in the Google databases did not allow an exhaustive examination. For example, the Google search for *refugees and 'mobile learning'* alone resulted in 84,100 hits. In addition to using the above terms, new searches were carried out to address terms and categories that emerged from the development of the report. For example, as the role of MOOCs in education for refugees became evident, additional searches in which the term MOOC was combined with the above terms were carried out.

c. Selective web searches

Additional web search strategies with the above search terms were carried out using Google's search engine. This was particularly relevant because the search in the scientific databases revealed much about informal mobile learning, but only a few projects with formal or semi-formal learning mobile learning approaches.

d. Back search of papers and online sources

This included projects and studies identified in prior reviews and landscape reports.

e. Snowball sampling

This was based on referrals from people, projects and programmes working in this area.

f. Other ways of information sources

Leads were followed from conferences and meetings such as the mEducation Alliance 2016 and resources such as the UNESCO ICT in Education division.

g. Interviews with experts and project managers

Although the review was based mainly on information that was publicly available, selective interviews were carried out to gather novel experiences that had not yet been documented on project websites or elsewhere.

Inclusion criteria

For a project to be considered in the analysis the following criteria needed to be met:

Projects embracing mobile learning activities: To be included, projects needed to be in line with a purposefully broad definition of mobile learning: the use of digital mobile technology, such as phones and tablet computers, for learning and teaching, and/or digital technologies that support learners' mobility. For example, although the higher education project Kiron does not specifically rely on mobile technology, it supports refugee learners' educational mobility as they move

across Europe, or within one country through the different stages of their asylum-seeking process. The review also considered projects that include but do not focus exclusively on mobile technology. For example, the Ideas Box includes tablets but also a much wider range of digital and non-digital resources.

This report also sheds light on informal mobile learning and situated problem-solving. Many functions and apps on mobile phones can serve as vital informal learning and problem-solving tools during the highly volatile situations refugees encounter during their flight and in camp or resettlement contexts. However, the sheer volume of emerging and existing apps that target refugees' broad information demands would require a separate report. In this domain the report can thus only selectively spotlight a few of the more popular examples. In addition, the report also includes initiatives that support refugees in developing coding skills, first because most of these are facilitated through mobile devices, and second because they are significant insomuch that they make refugees the designers of future mobile learning and communication solutions.

As UNESCO's definition of mobile learning embraces broad educational purposes such as effective education administration and information management, this kind of mobile learning system is also included. Although these systems do not enable direct learning and teaching activities, their mobile and flexible documentation features serve as a basis for monitoring and planning in highly volatile refugee and crisis contexts. No less importantly, the digital documentation of educational attainments can ensure learners' mobility as they progress through different educational stages or geographical areas, meeting a key educational need of refugee learners.

Refugee contexts: This report focuses mainly on mobile learning projects and studies to be carried out in refugee contexts, involving persons who have been forced to leave their country in order to escape war, persecution or natural disaster. This includes studies and projects involving refugees in different stages of mobility, ranging from flight and provisional or protracted camp contexts to phases of resettlement and integration. However, after initial searches returned only a limited number of papers and projects, some of the arguments have been additionally bolstered with a selective number of studies and reports on groups with characteristics similar to refugees, i.e. people displaced by emergencies and/or fleeing socio-economic hardships. In this regard, studies from integration and immigration settings, which include but do not focus explicitly or exclusively on refugees, were also considered.

Real educational activities on the ground: To be considered, a project needed to have moved beyond the stage of conceptualization with at least pilot activities in place. One of the few exceptions are the finalists of the EduApp4Syria competition, as these apps were subject to intensive expert screening and field piloting, and the principles and concepts of the apps endorsed are of interest to a wider readership.

Scale and innovation: Although the report sought to include as many projects as possible that met the above criteria, the number of existing projects exceeded the scope of the report. Therefore, priority was given to larger projects and/or projects with innovative and novel approaches.

It is important to state that in light of the many existing and emerging initiatives in the field, the broad educational scope of the report (covering all levels/fields of education, learning and teaching) and the reliance on web-based searches (which allow selective and not exhaustive analysis), it is impossible to cover all projects, and some interesting initiatives are likely to be overlooked.

Interviews

To be included, the interview partner needed to meet at least one of the following selection criteria: (a) being an academic expert with a publishing record that matched the scope of the report; (b) being a specialist with a practice-based track record, either with extensive experience, i.e. overseeing and working in several projects and initiatives; or intensive experience, i.e. an in-depth involvement in one of the projects examined in this report; or (c) being a refugee who has created, worked with or learned from mobile learning solutions. However, the dynamic development of the field and the limited time frame made it impossible to interview all experts in the field. In part, the recruitment was based on chain-sampling (Patton, 1990) and was opportunity-driven, e.g. interviews were carried out with experts available during Mobile Learning Week 2017. The interviews were conducted online via Skype and face-to-face during Mobile Learning Week. Interviews were semi-structured involving pre-defined question guides (see section 7.4). The questions were adapted according to the particular background and experience of the interviewee. They addressed (1) refugees' needs, (2) the design and context of the respective mobile learning project(s), (3) the formal and/or informal mobile learning activities, and (4) evidence pointing to associated benefits and constraints. According to established qualitative research standards, the questions were discussed flexibly and adapted according to the specific context of the interviewee. The discussion of new themes that emerged during the interviews was explicitly encouraged (Emerald Research Zone, n.d.; Lamnek, 2005). Upon approval from the interviewees, the conversations were audiorecorded and notes were taken during the interview. After each interview the notes were expanded and analysed.

Question guide

Refugees' needs

What are refugees' educational needs (in the setting of your project(s) and in general? What are particular challenges that they face in accessing educational opportunities?

The design and context of the respective mobile learning project(s)

Can you describe your mobile learning project? Who were the learners and teachers? What were the learning and teaching activities and associated goals? In which settings were the learning activities carried out? What kind of curriculum was used? What kind of hardware and software and other infrastructure was deployed? Were there any certification mechanisms in place?

Evidence pointing to associated benefits and constraints

Have you carried out any kind of systematic analysis of the feedback from learners and teachers? If so, how, and what were the results? What were the key challenges in developing and realizing the mobile learning intervention? What were success/influencing factors that impacted your project(s) and the educational outcomes? What makes mobile learning and refugee projects successful? What are other insights or lessons learned?

Further questions

Are you aware of other interesting/successful mobile learning and refugee projects? Can you recommend some further experts to us?

List of interviewees

Interviewee	Organization	Interviewer*	Date
1. Richard Rowe	OLE	CP	12.12.16
2. Haydee Izaguirre	OpenEMIS	CP	16.12.16
3. Chris Earney	UNHCR Learn Lab	CP	20.12.16
4. Moujahed Akil	Namaa solutions	CP	4.01.17
5. Aline Sara	NaTakallam	CP	9.01.17
6. Ana Rodriguez and Kate Radford	Warchild	UG	13.01.17
7. Aida Orgocka	BHER	UG	11.01.17
8. Negin Dahya	University of Washington	CP	18.01.17
9. Torben Schmidt	Leuphana University Lüneburg	CP	18.01.17
10. Felix Seyfarth	University St Gallen	CP	20.01.17
11. Richard Dent	Refugee Futures Initiative	CP	20.01.17
12. Mary Mendenhall	Columbia University	UG / CP	23.01.17
13. Barbary Moser-Mercer	InZone, University of Geneva	CP	24.01.17
14. Olly Parsons	GSMA	RZG	24.01.17
15. Jacqueline Strecker	UNHCR	CP	10.02.17
16. Florian Rampelt	Kiron Open Higher Education	CP	21.02.17
17. Ehab Badwi	Kiron (learner)	CP	17.02.17
18. Geoff Stead	Cambridge University	CP	20.03.17
19. Alf Inge Wang	Eduapp4Syria, NTNU	CP	21.03.17
20. Lucrezia Bisignani	Kukua	CP	21.03.17
21. David Hollow	Jigsaw Consult	CP	21.03.17
22. Tim Seal	The Open University UK	CP	21.03.17
23. Emmanuel Guardiola	Cologne Game Lab	CP	22.03.17
24. Cindy Bonfini-Hotlosz	Jesuit Worldwide Learning	CP	22.03.17

* CP: Christoph Pimmer; RGZ: Ronda Zelezny-Green; UG: Urs Gröhbiel

List of projects and initiatives

1. Alarmphone
2. Antura and the Letters
3. Ascend
4. Borderless Higher Education for Refugees (BHER)
5. BrainPOP
6. CHICAM
7. CodeDoor
8. Connect to Learn (CTL)
9. Coursera/US State Department refugee project
10. DigiSchool
11. EduTrac
12. E-learning Sudan
13. Feed the Monster
14. hackyourfuture
15. ICRC/RRCS Rwanda refugee phone project
16. Ideas Box
17. Instant Network School
18. Integrify
19. InZone interpreter project
20. InZone MOOC project
21. Jami3ti initiative
22. Jamiya project
23. Jesuit Commons Higher Education at the Margins
24. Jesuit Worldwide Learning community service learning tracks
25. Jesuit Worldwide Learning teacher training Programme
26. Kiron
27. Kmobile Schools
28. Learn Syria
29. Melbourne refugee peer support training programme
30. MoLeNET (refugee projects)
31. Nafham
32. NaTakallam
33. Nowall
34. Edraak online teacher training courses
35. Piagge social media storytelling project
36. Raspberry Pi for Learning Initiative (Pi4L)
37. Ready4Study
38. Refugee Code Week
39. Refugees on Rails
40. Samasource
41. Shupavu291
42. SIMA
43. SMS Story project
44. Tablet-computer-based survey programme for combatants in Burundi
45. Tabshoura
46. Teachers for Teachers
47. Thaki
48. TIGER Girls
49. Udacity's nanodegree refugee scholarship programme
50. UNESCO–Nokia mobile teacher training project
51. Voices Beyond Walls
52. Worldreader early grade reading project in Kenya
53. Worldreader e-book reading project in Tanzania

List of apps and platforms

1. Alfanus
2. Ankommen app
3. Antura and the Letters app
4. Apps for Refugees platform
5. ASCEND SMS system
6. Bureaucrazy
7. Coursera
8. Duolingo app
9. Edraak
10. EduTrac
11. edX MOOC platform
12. E-learning Sudan mathematics game
13. Facebook
14. Feed the Monster app
15. Gherbtna app
16. InfoAid app
17. Jami3ti platform
18. KA Lite
19. Khan Academy
20. Kmobile Schools app
21. MOIN app
22. Nafham
23. Nowall app
24. Open Learning Exchange system
25. OpenEMIS
26. RACHEL Offline
27. Refugee Projects platform
28. Saylor academy platform
29. SIMA app
30. Tabshoura
31. Tarjemly Live app
32. Udacity MOOC platform
33. WhatsApp
34. Worldreader app
35. YOBIS

Abbreviations and acronyms

BHER	Borderless Higher Education for Refugees
BYOD	Bring your own device
CHICAM	Children in Communication about Migration
CTL	Connect to Learn
EFA	Education for All
EGMA	Early Grade Mathematics Assessment
EMIS	Education management information system
ERIC	Education Resources Information Center
FHNW	Fachhochschule Nordwestschweiz (University of Applied Sciences and Arts of Northwestern Switzerland)
GESCI	Global e-Schools and Communities Initiative
ICRC	International Committee of the Red Cross
ICT	Information and communication technology
ICT4D	ICT for Development
IT	Information technology
JWL	Jesuit Worldwide Learning
KA	Khan Academy
MoLeNET	Mobile Learning Network
MOOC	Massive open online course
n.d.	No date
NGO	Non-governmental organization
NTNU	Norwegian University of Science and Technology
OECD	Organisation for Economic Co-operation and Development
OER	Open educational resources
OLE	Open Learning Exchange
Pi4L	Raspberry Pi for Learning
PIRLS	Progress in International Reading Literacy Study
PISA	Programme for International Student Assessment
RACHEL	Remote Area Community Hotspot for Education and Learning
SDG	Sustainable Development Goal
SMS	Short Message Service
SPOC	Small private online course
TIGER	These Inspiring Girls Enjoy Reading
TIMSS	Trends in International Mathematics and Science Study
UK	United Kingdom
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner on Refugees
UNICEF	United Nations Children's Fund
USA	United States of America
USAID	United States Agency for International Development
VLE	Virtual learning environment

A lifeline to learning

Leveraging technology to support education for refugees

Over 65 million individuals were forcibly displaced worldwide in 2016 due to persecution, conflicts, violence or human rights violations, presenting the highest levels of displacement on record since the end of the Second World War. Among them are nearly 22.5 million refugees (people who fled their countries to seek protection elsewhere), over half of whom are under the age of 18. The repercussions for education are severe and profound. The Sustainable Development Goals will not be achieved by 2030 if refugees and displaced populations are left without access to equitable and inclusive quality education and lifelong learning opportunities. In response to this need, individuals and organizations are attempting to leverage mobile phones, the most widely available technology in refugees' hands, to enable quick educational responses and sustainable interventions.

This publication examines the evidence base for key assumptions on using mobile technology to address individual refugees' learning challenges, broader education system challenges, and challenges to providing refugees with specific levels and types of education. The report presents findings from a review of 117 relevant papers and reports, and lessons drawn from the implementation of 52 projects that use mobile learning for refugees and the actual use of 35 digital apps or platforms. While acknowledging a limited reach, the report identifies effective mobile solutions and organizational strategies that should be scaled up.