

Digital Technologies Assisting Migrant Population Overcome Language Barriers: The Case of the EasyRights Research Project*

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Abstract. The issue of migrant integration in host communities is of major importance, because its effectiveness can influence employment opportunities, social cohesion, and economic welfare, creating equal opportunities among citizens. One of the greatest challenges towards this goal is the limited knowledge of the language of the host community, which can create miscommunication and additional difficulties to migrants. Basic language training is important, but it is of little help when migrants are confronted with the language used in complex procedures that are required for their inclusion in the new country of residence. This paper, which is descriptive and explorative in nature, focuses on the targeted digital solutions offered by the EU-funded easyRights research project that can help migrants effectively communicate and receive guidance, in order to handle the demands of various inclusion-related procedures that may differ from one country to the other. One of the digital tools presented in the paper aims at facilitating familiarization with the required domain-specific vocabulary, while the second one intends to offer pronunciation training, including training for the domain-specific words, in order to equip migrants with the knowledge and skills they need to communicate effectively. The two digital tools, which could act synergistically, employ advanced technology and are part of a technological pathway, whose aim is to assist migrants exercise their rights in the process of their integration in a new country. Implications are also discussed.

Keywords: Digital, Mobile-based Language Training, Migrant Integration.

* The project is funded by the EU Horizon 2020, grant agreement ID: 870980. However, the full responsibility of the paper and the opinions expressed herewith are solely of the authors and do not necessarily reflect the point of view of any EU institution.

1 Introduction

The fast pacing technological evolution that has occurred in recent years paved the way for unprecedented changes in human life and communication and brought promises for solutions to problems that relate to various fields of human action. One of these fields that have always been challenging and where technology can provide effective solutions is social organization and active citizenship [1], especially in cases in which societies consist of multicultural and plurilingual populations, as a result of the rising migration trends. This paper focuses on the European context and on the technological solutions that can be employed with the purpose of assisting the migrants' social inclusion in new places of residence, by helping them overcome the language barrier and exercise their rights.

1.1 Migration and Integration in Europe: Facts and Trends

The issue of migration in Europe has attracted increasing attention in recent years, because there is a great number of people from various countries and nationalities that have been constantly crossing the EU (European Union) borders in an effort to chase opportunities for a better life. In fact, it has been estimated that more than 1 million people have entered the EU borders during the 'refugee crisis' in 2015 [2] and this number keeps growing with even more third country (non-EU) nationals from various parts of Africa, the Middle East or the Black Sea countries constantly reaching the European continent and following different routes [3-5].

The reasons for migration vary and may also determine the status of the 'moving person', who is generally called a 'migrant', but falls, in fact, into one of the three following categories [6-7]:

1. Asylum seeker: A third-country (non-EU country) national or stateless person who has usually been forced to leave the country of origin, mainly for reasons of war, persecution or human rights violation, and has made an application for protection to another country, in respect of which a final decision has not yet been taken and as a consequence, he/she has not been legally recognized as a refugee yet.
2. Refugee: A third-country national or stateless person who has voluntarily left the country of former residence and is unwilling or unable to return, because of fear of persecution for reasons of race, religion, political opinion or membership to a particular social group and to whom the right of international protection is recognized.
3. Migrant: A person who has usually been a resident in a third country and establishes his/her usual residence in the territory of an EU Member State for a period that is, or is expected to be, at least 12 months and is neither a refugee nor an asylum seeker.

The term 'migrant' is going to be used as an umbrella term in this paper to refer to all these three categories.

Regardless of the reasons for moving to another country, migrants have acknowledged human rights that should be respected in any case, so that violations and marginalization can be avoided [6,8]. Consequently, the migrants' integration in host communities should be a priority. However, this also seems to be a challenge, since there is not always a clear perception of what the process of integration entails and how it can be achieved. In fact, integration is sometimes considered as a one-way process of adaptation, that refers to the migrants' 'acculturation' or 'assimilation' to the host community's culture, way of life and mentality [9]. Instead, the definition provided in [10] describes migrant integration as "a two-way process of adaptation", during which both the migrants but also the host communities should become aware of their exact rights and obligations and collaborate towards shared goals, some of which are the respect for common values as well as access to services and the labor market. This definition manages to include the concept of the 'social engineering of integration' that is likely to lead to functional multi-cultural societies [11].

Apart from the definitional ambiguities, it seems without doubt that the issue of migrant integration is closely related to the migrant's human rights, safety and legal identity, thus rendering it necessary for host countries to design migration policies and specify criteria for integration, such as the 'Zaragoza integration indicators', which examine the level of integration in the areas of education, employment, social inclusion and active citizenship [12]. These initiatives are directed towards the confrontation of the practical challenges involved in the integration process, which include, among others, information poverty [13], bureaucratic, legal and cultural barriers as well as limited proficiency in the local language [14].

In fact, the migrants' limited knowledge of the language of the host community seems to be a serious issue, since it may create miscommunication and feelings of disappointment, making migrants miss opportunities to familiarize themselves with the host culture, expand their social contacts and match their skills with the local labor market [9, 15-16]. Therefore, the language gap could hinder the migrants' active participation in host communities and prolong the process of their social inclusion, thus rendering language learning "a first-priority intervention for the general migrant and refugee community" [17, p.100]. This explains the need for the design of language and education policies that carefully consider the issue of language diversity and recognize the migrants' literacy as an essential right and a prerequisite for their actual integration in a society that regards them as citizens with equal rights [18].

All these challenges that relate to migrant integration can be confronted to a great extent by the means of digital technology tools, such as automation, digitalization, robotics, artificial intelligence, the Internet of Things (IoT), web-based platforms and location-based applications, which have changed the landscape of economic transactions and social processes on a global scale in recent years [14, 19-20]. In addition to the management of migration flows and border control, digital connectivity can also provide valuable solutions in the newly arrived migrants' information about local administrative and housing services, labor market and entrepreneurship opportunities as well as educational and training courses [21-22].

The section that follows describes how the migrants' knowledge gap in the language of the host country can be covered by innovative training practices that involve digital technology, as part of the process towards their social inclusion.

1.2 Digital Technological Solutions for Migrant Language Training

On a global level, the ownership and use of mobile phones and social media connectivity have been following a rising trend which can be partly justified by the increased investment in advanced technologies as well as by the availability of low-cost smartphones and data consumption offers [23]. Meanwhile, smartphones are widely recognized as an essential tool for migrants to keep contact with their country of origin and survive in the new country, since web sites, phone-based applications and social media are the main sources of information about the pre-migration, settlement as well as integration stages [24-25]. Despite the fact that mobile-based internet connectivity may still not be feasible for all migrant populations and in particular for refugees found in rural areas [26], the facilitating role of technology and particularly the digital connectivity offered by mobile phones is also emphasized in the 2030 Agenda for Sustainable Development, since it can help toward migrant integration, which can contribute to the economic and social development of both the destination countries and the countries of origin [27].

Among the technologies that have been commonly employed with the purpose of supporting migrants' social inclusion, employability, education and training in the language of the host country, those that relate to mobile-based digital connectivity are the most popular, such as Free Digital Learning (henceforth referred as FDL), Massive Open Online Courses (henceforth referred as MOOCs) and gamified learning platforms [17, 28-31]. These technologies, whose educational benefits have already been confirmed in various settings that do not always relate to migrant integration purposes [32-35], seem likely to offer great potential, especially in cases where there is no funding or opportunities for formal education or live training courses and can also help migrants handle any difficulties or language issues even long before starting their journey to a foreign country.

Concerning the migrants' language training, in particular, Colucci et al. [28] provide examples of several apps, MOOCs and FDL online courses, that primarily appear as language learning initiatives, but they also serve as a means of assisting civic integration (e.g. guiding migrants to cope with administrative procedures). The authors support that these tools can adapt the content of learning and the related vocabulary to specific situations that relate to the migrants' needs, following an approach that is very close to "Content and Language Integrated Learning" (CLIL) [36].

In the same vein, Castaño-Muñoz et al. [30] point out that MOOCs and FDL can be effectively used towards assisting not only migrant civic integration and employment, but also language learning and participation in higher education, offering great potential and many options in terms of the mode of learning. Concerning the FDL intended for language learning, the authors point out that there are several initiatives that target the migrants' language learning needs, whose development has been favored by the widespread use of mobile phones, the great number of translation apps, commercial mobile

apps (such as Duolingo and Babbel) and educational videos that can be watched on line for free as well as the possibility to readapt many open resources, MOOCs and university language courses to create free material that can be used either online, off line or in a face-to-face context of language instruction. Some digital applications that are mentioned as examples are Welcomm!¹, which promotes non-formal language learning and Kiron², which addresses refugee students and prepares them for admission in the German Higher Education system, by offering online language courses in combination with online practice in other competencies.

Moreover, the combination of FDL with gamification, that is the “use of game-design elements in non-game contexts” [37, p. 2425], can effectively contribute to educational purposes, since gamification has been found to make the whole learning process more enjoyable and motivating, reducing learners’ anxiety and building confidence in the foreign language [29, 34-35]. In fact, the combination of mobile learning with gamified activities, could offer several benefits in language immersion programmes where migrants are the target users, by promoting learner autonomy and maximizing the benefits of informal situated learning.

In relation to mobile learning, in particular, Kukulska-Hulme et al. [29] review three projects that use mobile learning technology to achieve contextualized language learning beyond the classroom in language immersion programs. The first one is the MASELTOV project (Mobile Assistance for Social Inclusion and Empowerment of Immigrants with Persuasive Learning Technologies and Social Network Services), which is based on a context-aware smartphone application that combines language learning with game playing services, social interaction, navigation and information [32, 38]. In the SALSA project (Sensors and Apps for Languages in Smart Areas), mobile language lessons attain a game playing character, since they are triggered by bluetooth beacons and also include a treasure hunt or trail [39]. The third project reviewed is the ‘Mobile Pedagogy for English Language Teaching’, which explores learners and teachers’ views on the use of phones and tables for language learning, on the basis of which a Mobile Pedagogy framework has been developed that can guide efforts to design mobile-based language learning practices.

The benefits of digital language learning for migrants of different age groups have also been confirmed by other studies, in which digital tools have the potential to promote familiarization in the vocabulary and pronunciation of the host country along with cultural training [40], expressive L2 vocabulary acquisition in children from low-income families [41], personalized L2 training of illiterate adult migrants, which can also lead to increased learner motivation and self-esteem [42] as well as learner autonomy through a dynamic, task-based approach [43].

Given the major contribution of technology in the field of migrant integration, language migration policies and research have been focusing on the improvement of the synergies between technological innovations and social integration schemes. In what follows, there will be a presentation of an EU initiative, the easyRights research project that intends to provide further solutions in this field.

¹ <https://welcomm-europe.eu/>

² <https://kiron.ngo/en/>

1.3 The EasyRights Research Project

The Research Executive Agency (REA), which was established by the European Union, has organized the 2018-2020 call on Migration, whose aim is the production of innovative solutions, which include ICT, for the effective governance of issues that relate to migrant integration in host communities. Part of this Call is the EasyRights Horizon 2020 research project, which basically intends to satisfy the needs of migrants, who encounter several difficulties in relation to administrative procedures and the documentation of their arrival in host countries and also help towards the deeper integration of already established migrants, by providing solutions based on advanced artificial intelligence technology.

In an effort to make migrants aware of the required actions and their rights during this transitional stage before their inclusion in host communities, the easyRights project has designed a Natural Language Processing (NLP) intelligent system that presents administrative procedures as a series of steps that migrants need to take, thus creating workflows of action for specific administrative requests that can be frequently updated any time political or administrative changes might occur. This system is partly based on personalized learning and automated technologies that combine machine learning and gamified activities, which are employed for the creation of a vocabulary training mobile app (Capeesh) as well as for a pronunciation training platform (CALST) that can provide migrants with domain-specific knowledge that is required for the completion of different procedures. These digital tools are designed for migrant needs in four European cities, namely Birmingham (UK), Malaga (Spain), Larissa (Greece) and Palermo (Italy), for different purposes (see Table 1). What is interesting is that these digital tools are adapted to different languages, given that the native languages in the four pilot cities are not the same and the migrant populations under study come from various cultural and language backgrounds.

Table 1. The four pilot cities and the different migrant needs the easyRights digital tools intend to provide assistance for.

Pilot city	Migrant needs related to integration
Birmingham (UK)	<ul style="list-style-type: none"> - Checking vehicle compliance with the city's Clear Air Zone - Participating in public consultation - Registering and completing an online assessment tool for access to learning English
Larissa (Greece)	<ul style="list-style-type: none"> - Applying for residence permit - Applying for certification of nationality
Malaga (Spain)	<ul style="list-style-type: none"> - Applying for asylum - Searching for employment
Palermo (Italy)	<ul style="list-style-type: none"> - Registering at the Registry Office - Searching for employment

In the sections that follow there will be a description of the methodology followed in order to construct the task-specific language learning app (Capeesh) and the pronunciation training tool (CALST) as well as an exemplification of how they work.

2 The EasyRights Digital Tools for Migrant Language Training

2.1 Capeesh: A Digital Tool for Vocabulary Training

The growing availability of mobile technologies has contributed to an increase in mobile-assisted language learning in which learners can autonomously study a second language (L2) anytime or anywhere [44]. To help migrants learn the language required to understand critical information provided in authentic situations, the Capeesh Language Learning mobile application offers exercises that teach the domain-specific language used in such authentic situations. The Capeesh Language Learning application is a self-directed, gamified and asynchronous language learning application designed to teach progressive language skills with an emphasis on teaching domain-specific language and providing any language combinations (L1-L2) for the unique learners. Capeesh language learning application combines communicative didactics, cognitivism, and constructivism with game theory and spaced repetition training [45]. The content in the easyRights project consisting of domain-specific vocabulary, sentences and dialogues is built up using natural language processing technologies to analyze text material provided by the municipalities of Birmingham, Malaga, Palermo and Larissa. Boulton and Cobb [46] had earlier conducted a meta-analysis that found corpus-based or data-driven learning to result in better learning outcomes than traditional approaches. The corpora provided by the municipalities in the easyRights project enable Capeesh to create numerous contextualized examples of how any given word, phrase, sentence, or concept is described in the target languages (i.e. English, Spanish, Italian and Greek), thus enabling the migrant learners to learn the language corpus that is most critical or salient to them in the process of accessing and understanding their rights (see Fig. 1).

The migrant learners in the easyRights project can be categorized as second language learners (SLLs) because they are speaking their maternal language first, for instance Arabic, while learning the language spoken in their host country. More shaming occurs with second language learners than foreign language learners and the SLLs are therefore often pushed to relinquish their primary language and learn the dominant language in the host state [47-48]. In the easyRights pilot cities Birmingham, Malaga, Palermo and Larissa, the languages of English, Spanish, Italian and Greek are respectively promoted as official languages. Government policies that globally promote official languages over others create language hierarchies either overtly or covertly [48]. If the language used in legal procedures and immigration processes is only made available in English, Spanish, Italian or Greek, this can invalidate and devalue heritage and minority languages in the mainstream society. In order to support the migrants in bridging this language gap, Capeesh provides personalization in terms of the language app experience and also in the onboarding experience for the migrant learner. Capeesh does this

by enabling the addition of multiple minority languages as display languages for all four language courses (English, Spanish, Italian and Greek) and the language learning app automatically sets the display language to be the same language as the language setting on the learners' smartphone. When adding minority languages or indigenous languages to the app, one of the main challenges is making sure that there exists a digital alphabet that is globally understood by the native speakers and that can be imported and visualized in the Capeesh application.



Fig. 1. A schematic representation of the Capeesh AI pipeline³

The Capeesh technology enabling efficient creation and publication of domain-specific language courses with multiple (L2) display languages has been developed by Capeesh AS and utilized by organizations in the private and public space since 2018. Although the app is able to provide all language combinations and a highly customizable language learning corpus, there are situations where a direct translation of either vocabulary or expressions taught does not exist in the maternal language and therefore requires either cultural or creative interpretation. Examples are compound words such as “working environment”, where a direct translation in maternal languages such as Tirginya does not exist, due to cultural differences. Legal processes in different countries are highly likely to differ due to culture. That is why Capeesh has also added manual steps in the translation process in order to provide translators with explanations of certain vocabulary or expressions that are culture-specific so that the translator can create an explanation or new translation of the expression or vocabulary taught.

Another challenge the Capeesh technology addresses is the analysis of legal documents. For example, analyzing legal documents in Greek language requires state-of-the-art natural language processing algorithms to be developed to work for the Greek alphabet. In 2020 no open natural language processing algorithms (NLP) for Greek

³ The figure is adapted from the Capeesh website (<https://www.capeesh.com/>) after permission.

language existed. Capeesh has therefore since spring 2020 worked to build Greek NLP in order to enable authentic language learning needed to help the Greek migrants access and learn their rights.

While many of the above problems are addressed in Capeesh, little is known about the migrant learners' motivation for language study in terms of preferred context of learning, desired learning outcomes, cultural preferences and needs to learn pragmatic competences and domain-specific language. A final challenge in the language corpus creation process is to ensure that there is no information asymmetry between the problem experienced by the content provider (municipalities, NGOs) and the problem experienced by the learners (the migrants). There is therefore a need for continuous and collective work between the corpus creators and learners to overcome such information asymmetry by conducting hackathons, surveys and extensive user testing in the creation process.

2.2 CALST: A Digital Tool for Pronunciation Training

The vocabulary training tool presented in the previous section complements basic language training. It teaches vocabulary for specific topics which are related to complex procedures which migrants need to deal with in order to achieve inclusion in the new country of residence, e.g. the application for a residence permit in Larissa, as presented in section 1.3. To apply for a residence permit, migrants may need to interact with public authorities using spoken communication, for example an interview. It is therefore important to put migrants in a position where they not only know the vocabulary of the new language, but they also know how to pronounce the words.

Speaking a new language is a difficult task. Complex patterns of articulatory control in the native language that have been learned over a lifetime must be adapted to those of the new language. Like any other skill, a lot of training is required to improve one's pronunciation. As long as this process is ongoing, speakers will have a foreign accent, which is not necessarily a problem. The goal for second language learning has therefore shifted from native-like pronunciation to intelligibility and comprehensibility [49].

Incorrect pronunciation can reduce intelligibility and lead to misunderstandings [50]. Many misunderstandings can be resolved because the listener can use the context in which a word is used to come to a correct understanding of the migrant's intended message. Nevertheless, research has shown that listeners often are prejudiced when a speaker has a strong accent. For example, speakers may be considered less trustworthy [51]. This is true even if the listener is aware of the prejudice. It is therefore in migrants' own interest to reduce their foreign accent. This underlines the importance of pronunciation as a skill that enables migrants to communicate successfully to achieve their goal of inclusion in the host society.

To support migrants to achieve this goal, the Computer-Assisted Listening and Speaking Tutor (CALST) [52] offers exercises for all words in the domain-specific vocabulary that contain challenging sounds. The exercises consist of pronunciation exercises, in which the migrant compares his/her pronunciation of a word with that of a tutor, and spelling exercises which include feedback to the migrant. Languages differ

which phonetically similar sounds are contrasted, in addition to pronunciation and spelling exercises. These comprehensive exercises do not use the domain-specific vocabulary, but instead learning material is used that is based on linguistic criteria. The listening exercises focus on so-called minimal pairs, i.e., word pairs which contrast a word containing a specific challenging sound with a similar word in which that sound is replaced by one which is familiar for the language learner, like in the English word pair “shell – sell” which differs in the first sound.

Problems in learning to pronounce a new language are not restricted to individual sounds (consonants, as in the figures above, or vowels). Learners also find it difficult to pronounce sounds which occur in unfamiliar positions, even if they have the sound in their own language. A simple example is that of final devoicing, as in Syrian Arabic, where for example voiced syllable-final /d/ is replaced by its voiceless counterpart /t/ (but cf. [56]). To deal with such challenges, CALST offers exercises for consonants in both word-initial and word-final positions.

Depending on the allowed syllable structures in the migrant’s native language, consonant clusters may be difficult to pronounce. A Farsi speaker may have difficulty with pronouncing a Greek word starting with ‘sp’, and solve this by adding an epenthetic vowel before the cluster; the effect of this is that the vowel together with the s makes up a separate syllable, the results of which is a structure that is allowed in their native language. Speakers with other native languages may choose other so-called “repair strategies” to create admissible structures, for example cluster reduction (deleting a sound in the cluster), substitution (replacing a sound by another to create an admissible cluster) or for instance insertion of a vowel between the two consonants. For some of the target languages in CALST, consonant cluster exercises have been implemented which can help to un-learn syllable structure restriction which do not apply in the target language.

Some languages do not have word stress or they always have stress on a fixed syllable in the word (the first or last, or the one-but-first or one-but-last). Speakers of these languages are often stress-deaf [57] and will have difficulty learning to realize stress correctly, as for example, in Greek where stress is lexical and not predictable from the syllable structure of the word. The correct realization of stress is important for the perception of rhythm and is a major hindrance for comprehensibility if realized wrongly.

Finally, intonation or sentence melody is important to get across the intention of the speaker. It is also a language property that lingers longest when learning a new language, and it is difficult to teach in online systems.

Many of the above problems are addressed in CALST, although not equally for all languages. Because little of the knowledge we have about the influence of a migrant’s native language on the acquisition of a new language can be implemented in a hands-on pronunciation training system like CAST, all exercise results in CALST are logged together with the learner’s native (L1) and target language (L2). In this way, the system can learn from previous users and adapt the selection of exercises to the combination of L1 and L2 to tailor pronunciation training more and more to the learner and reduce unnecessary exercises for mi-grants learning a new language.

Moving to a new country is in itself a very taxing experience. Language learning should be as effective and enabling as possible, helping migrants to achieve their goal of social inclusion.

3 Digital language learning for migrants: implications

One of the main challenges migrants experience in the easyRights project is the lack of both foreign language skills and the pragmatic competences needed to perform necessary administrative procedures and communicate effectively. This seems to be a major problem, since the migrants' awareness and learning of domain-specific knowledge required by the host country actually affects their ability to access and understand their rights in a target country. In fact, the importance of sociolinguistic knowledge is also addressed in [58], by showing that on the lower levels of language competence, sociolinguistic and pragmatic competences were considered important in compensating for lacking linguistic competence. Moreover, Kärkkäinen's [59] study of learning, teaching and integration showed that both trainers and migrants associate difficulties in learning, teaching and integration with the existence of cultural differences and poor language skills. While language learning is viewed as a lifelong process, new technologies can help provide opportunities that substantially support effective language learning by enabling the creation of learning activities, tasks and experiences that are truly authentic to the migrant learner, take place in authentic contexts, involve authentic language in order to optimize language learning [60] and also assist towards social awareness. With context playing a critical role in the foreign language (FL) learning, context-aware technology is a promising tool for support of FL learning [61]. The digital tools presented in the previous section can help migrants improve their knowledge of domain-specific vocabulary and exercise their pronunciation skills, through tasks that are personalized and adapted to specific migrant needs, by taking into consideration language and procedural factors that relate to the context of communication. As a result, when the migrants use these tools, they will be trained to properly communicate in the language of the host community and exercise their rights.

However, the compelling and challenging task of accessing and understanding critical information in a new and foreign country, particularly while lacking formal language knowledge and pragmatic skills, does not only concern the migrant population. Castañeda [62] suggests that such learning has ceased to be considered a personal challenge and, instead, has become a socio-economic imposition of a hypercompetitive society. An important presumption when investigating digital technologies' ability to assist migrant populations overcome domain-specific language barriers is therefore that the migrants are aware of the problem and that they experience a need for better information. According to Kessler [63], the new worldwide participatory culture presents FL teaching with limitless opportunities to create for learners meaningful, authentic language practice experiences that situate learning in truly compelling contexts. This implies a need to provide migrants with opportunities for foreign language training that

situates the learning process in the context of accessing and understanding their rights in authentic situations like job seeking, asylum processes and processes of applying for social benefits.

In contexts where technological solutions are targeted towards complex social and civic challenges, an important factor that should be taken into consideration is the issue of testing and validating the technological prototypes that are designed for these purposes. This can actually happen if the end users of the technological solutions are actively involved in the design and implementation process, providing substantial feedback in relation to their needs and the extent to which they are satisfied by the digital tools that are offered. In fact, this kind of interaction among the experts in the field of technology and various stakeholders that may range from public administrators, business people to the actual end users of the technological products, is found at the heart of the concept of “participatory design”, which is people-centered and close to a humanitarian approach regarding the use of technology [64-65]. This kind of collaboration among various stakeholders that all have a common goal in relation to the use of technology can take place in hackathon events, which initially had a purely technological orientation, but have gradually acquired a social dimension, aiming to bring together experts from different disciplines as well as citizens in order to exchange opinions and find effective solutions to common problems [66-68]. In fact, the technological tools that have been designed within the frame of the easyRights project are currently being tested in organized hackathon events that take place in the four pilot cities, where technology experts collaborate with local administration stakeholders, academics and migrants, in order to examine the extent to which the vocabulary and pronunciation tools work effectively towards the integration of migrant populations with different needs. Based on the feedback received during the hackathons, improvements or alterations to the existing digital tools might occur, with the purpose of properly adapting them to the needs of the end users in each pilot city.

4 Conclusion

The technological solutions that are described in this paper aim not only at equipping migrants with the language knowledge and skills they need for important everyday transactions, but also with specific guidance regarding the administrative procedures they are required to perform in the process of their actual integration in the host communities. This is an effort that is embedded within the wider goal of creating societies based on active citizenship and equal opportunities by the means of digital tools that facilitate public procedures and serve humanitarian purposes. As suggested in [31], the migrants’ involvement in learning designs that involve technological innovations can inspire new perspectives in relation to other mobile populations as well, such as students and business people. Within the same frame of thought, the globalization of migration and its related social challenges should be faced as an opportunity for technology to demonstrate its full potential, by exploiting the human and digitalization interface for the benefit of the former. In the world of ‘human-technology symbiosis’ [1],

technology is expected to adapt itself to the needs of multicultural societies, by mitigating social differences and providing opportunities for active democratic citizenship.

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