Co-designing and piloting an Integrated Digital Literacy and Language Toolkit for vulnerable migrant students in higher education

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Abstract

This paper presents the process of co-design, co-production, piloting, evaluation and revision of an Integrated Digital Literacy and Language Toolkit for Vulnerable Migrant Students (VMs) in Higher Education (HE). The language element focuses on academic language skills of reading, writing, listening and speaking required for effective involvement in both the host society and HE learning; the acquisition and improvement of digital literacy skills enable VMs to successfully participate in, and contribute to, university and societal collaboration, creativity and content curation. The Toolkit resulted from the co-operation and collaboration of five EU universities and was based on the ASSURE instructional design model. The Toolkit offers a self-access, self- paced, non-linear, fully online set of ten stand-alone units which offer a range of materials and activities to develop those skills pertinent to VM academic language and digital literacy needs. Evaluation by a group of VMs resident in EU countries highlight the positive impact of the Toolkit and validates the instrument as fit for purpose. Noteworthy aspects include its usefulness in supporting student autonomy, improving digital capabilities and academic language mastery,a positive experience of a flexible learning experience along with access to open resources of international scope and dissemination under the Creative Commons licence.

Keywords Digital literacy · Distance learning · Higher education · Language · Refugees · Vulnerable Migrants · Toolkit

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1 Introduction

To date, despite the continuously growing levels of human displacement globally, and in view of the current UNHCR estimate that only about 3% of the world's 25.9 million refugees have access to HE opportunities in the host states, EU universities are still a long way from the target of 15% set for 2030 (UNHCR, 2019).

Both the HE environment and 21st century society demand that Vulnerable Migrant students (VMs) need sophisticated levels of academic language as well as digital literacy to align with the Europe 2020 initiative and develop the graduate attributes- including productive engagement in online communities and successful use of technology- to work and research in our digital world. Barriers to university access, retention and completion for VMs include a lack of host country language proficiency for both socialisation (Arar et al., 2020; Saiti & Chletsos, 2020) and academic performance (Bajwa et al., 2017; Saiti & Chletsos, 2020), along with digital literacy skills below the level required.

Competency in the host country language is a pre-requisite to both educational and social inclusion but VMs studying at university taking courses delivered through a second language face numerous challenges. These include mastery of academic' concepts, and terms used in classrooms, all of which produce a unique subculture that VMs need to understand in order to achieve success (Zamel & Spack, 1998).

Closely aligned to the need for language competency is a mastery of digital literacy, a skills set which facilitates a student's ability to successfully complete activities in a digital environment. Defined as "those capabilities that fit someone for living, learning, working, participating and thriving in a digital society" (HEE, 2016), digital literacy allows the student to read and interpret media (text, sound and images), to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge learnt from digital environments to pursue higher education studies. In education, digital literacy also includes curation, "the collection, organisation, interpretation, annotation, and sharing of online resources by students on a topic of inquiry" (Ostashewski et al., 2014).

Hence, the need for both language skills and digital literacy capability is key in supporting VMs to achieve within higher education. According to MacMillan and Mackenzie (2012), university students need to be able to "Prospect" (find information, lift, sort, and evaluate it), "Interpret" (translate into knowledge, insight and understanding) and "Create" (new ideas through developing insights). These abilities are necessary for success in 21st century learning; as such, VMs who lack these skills are likely to encounter serious challenges.

This education development project, Learning to Live Digital Literacy and Language Toolkit for vulnerable migrant students in Higher Education (L2L DL & LT) emerged from a broader participatory project, *The Learning to Live and Work Together* project (L2L), framed in the 2018 Erasmus+ call for proposals for the key action known as Cooperation for Innovation and the Exchange of Good Practices – Strategic Partnerships for Higher Education. Conducted over three years (Sept 2018 - Aug 2021). It has been led by the University of Bradford,

UK, in partnership with University College Cork, Ireland and the Universities of Savonia, Finland; Mariboru, Slovenia; and Rovira i Virgili University (URV) in Tarragona, Spain. In order to foster intercultural understanding and mutual benefit for all students involved, the L2L project aimed to produce an integrated digital literacy and language toolkit, a digital multi-media platform web-hub and a bespoke mobile application for vulnerable migrant students. It is the first of these three outputs which is presented in this paper.

Although an internet search will present a wide range of online Toolkits which offer language support and development materials (NATECLA, Migration Yorkshire, ESOL for Refugees, English Learner Toolkit USA, UK Excellence Gateway) these do not meet the needs of our VMs for two key reasons. Firstly, the majority of language toolkits are aimed at either English for Speakers of Other Languages (ESOL) tutors or learners, often for a lower age group than 18+, tend to focus on the development of language for survival in a new community and culture and are often aimed at a low level of language proficiency (Council of Europe, 2001).

Secondly, the content of such courses does not address the needs of students who are studying various subjects within the higher education academic environment. As such, learners would be disadvantaged as most online language courses concentrate on everyday social situational communication needs with no reference to the academic conventions which university students are required to master and apply in order to succeed in their studies. Admittedly, VMs in HE need to gain social communication skills to assimilate successfully into the host country life and culture, but the demand for academic skills is paramount for their academic achievement.

In addition, although there is range of easily accessible online courses for developing digital skills (University of Southampton Digital Literacies Toolkit / Future Learn / British Council etcetera), these are mainly aimed at either mastering basic computer skills, or are at a lower age group or language level than required for HE VMs. In addition, the existing online digital literacy toolkits have been created for use by particular groups of learners- such as health professionals or employees from a specific workplace, and are therefore of limited value for university students. The importance of this L2L Toolkit is that it supports VMs to navigate the increasingly complex digital landscape in ways which are directly pertinent to their personal studies. It encourages learners to participate meaningfully in their online community whilst staying safe online, critically evaluating materials accessed and applying new information where relevant using a range of free digital tools and services.

Hence, there is a clear absence of studies into interventions to address refugee students' needs using digital technology innovation and academic language mastery in higher education, as current and previously funded Erasmus+ projects such as inHERE and SUCRE projects (European Commission, n.d.) have focused on improving social integration. A systematic review (Mangan & Winter, 2017) found that refugee students felt their needs were not met in the higher education setting. Given that the course content underpinning this Toolkit emerged from current VMs expressing their needs alongside HE academics identifying barriers to VM success, it responds directly to the language and digital literacy needs of those VMs at the heart of this project.

2 Methodology

2.1 How the Toolkit was developed

The pedagogical approach underpinning the design and delivery of this Toolkit draws on the theory of social constructivism supporting collaborative learning, real life tasks, individual reflection and shared learning with the technology embedded within each unit enabling learners to learn with, as opposed to from, technology (Good, 2001). It is based on the principles of sound educational practice (Chickering & Gamson, 1987) including emphasising active learning techniques and respect for diverse talents and ways of learning. This method of enquiry-based learning encourages learners to be analytical and to develop critical thinking skills to solve a range of real-life problems; hence, the learning approach behind the Toolkit design and the delivery methods applied are closely interlinked.

Careful consideration was given to the design of the Toolkit, taking into account the experience of the design and development team members alongside the literature on English for academic purposes, materials selection and creation and content-based instruction (Arias & Faltis, 2013). The design team consisted of six project researchers (2 from University of Bradford/4 from URV team), with the toolkit developed in English in the first instance.

The Toolkit was guided by the following: the ASSURE Instructional Design Model, the JISC Digital Capability Framework and Universal Design for Learning. The three models are described in further detail below.

2.2 The ASSURE Instructional Design Model

Firstly, given that this project aims to develop digital literacy skills through active participation by VMs, the ASSURE model was deemed an appropriate guide for planning. It has at its heart the learner and the accomplishment of stated objectives through independent and shared activities and draws on multimedia and technology to augment the learning experience (Lefebvre, 2007). In addition, it acknowledges that not all learners acquire knowledge in the same way and applies technologies rather than relying on traditional text-based approaches to deliver instruction, a major barrier for refugee learners whose prior experience may well have relied on traditional "talk and chalk" methods (Mangan & Winter, 2017).

The **ASSURE** model involves six steps:

Step 1. Analyse Learners

The participants of this project were identified at each university by their response to an email outlining the aims and objectives of the project and inviting participation from those who met the criteria for inclusion. Successful respondents were aged 18 or over, enrolled onto a full time course at the partner university in the current EU country of residence, held asylum seeker or refugee status,

gave informed consent and, at a follow up face to face meeting, could evidence English language ability which enabled them to follow and participate in a short discussion with the researchers. There were 27 participants.

Step 2: State Objectives: The project Output 1 objectives are:

- a simple version of a(n) academic language course
- language teaching through digital technologies
- development of basic digital literacy skills via peer interaction

The first stage was to identify the student needs. Using design team expertise, student consultation, a literature review and discussion with EAP academics, students' language needs were identified as :

- academic language (formal & objective, analytical & impersonal)
- language functions (to advise, analyse, persuade etc) which students would need to use in both written and oral work.

Specific Skills identified included:

- Listening - for understanding lectures / note taking etc
- Reading - to understand information /attitude etc
- Speaking - in seminars /presentations etc
- Writing - academic essays / reports /case studies etc

As non-native English speaker students are required to have a Common European Framework of Reference (CEFR) B2 level of English (Council of Europe, 2001) in order to enrol onto most UK University courses, course content was aimed at this level with optional additional support materials made available.

Taking the European Commission (2008) definition of digital capability as being *the confident and critical use of ICT for work, leisure, learning and communication* it is clear that digital literacy is becoming an essential life competency *a lack of which can become a barrier to social integration and personal development.*

The core team identified that the VMs needed to gain confidence in digital literacy skills for a range of purposes, including but not restricted to academic research, writing and critical thinking, communicating ideas in a range of media, producing, sharing and critically evaluating information, and collaborating in virtual networks (Beetham, 2015). To guide the design, the team applied the **JISC Capability Framework** (JISC, 2015) as the six domains would help ensure that students could evaluate and use information critically and apply new learning to their personal contexts whilst remaining safe within the online environment. The JISC framework also focuses on problem-solving and innovation to develop the digital capabilities required by post-16 learners and has at its core the importance of learners understanding issues around digital identity and wellbeing, key concerns for VMs preparing for 21st century study and, ultimately, employability.
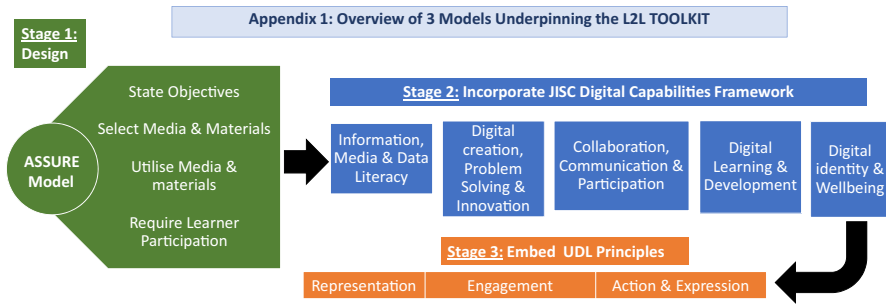
Fig. 1 Illustrates the integration and interplay between the 3 conceptual frameworks used in the design of the toolkit

As such, the framework was an appropriate guide for the digital capabilities the toolkit aimed to develop in our HE VMs Fig. 1.

Step 3: Select Method, Media, Materials

The priority had to be that materials were fit for purpose, easily accessible, readily available or possible for the design team to create. Hence, materials were selected (or created) which were high quality, up to date, relevant and unbiased and which would develop the required skills aligned to the learning outcomes. It was also important to ensure that all students had an equal and inclusive learning experience and for this we drew on the Universal Design for Learning (Ministry of Education, New Zealand, 2016), an approach which ensures the removal of barriers to learning. This is done through adherence to the approach's three key principles, Multiple Means of Engagement, allowing flexible and innovative ways for learners to participate; Multiple Means of Representation, adopting flexible study resources via a range of formats (text, video, audio etc) and Multiple Means of Expression / Action whereby the learners are offered options to demonstrate their learning (creating a podcast, Discussion Board contribution etc).

Applying Universal Design for Learning (UDL) principles ensured flexibility as materials and activities can be adjusted to meet diverse learner needs by ensuring flexibility in pace, optional activities and personalised tasks, thus overcoming or reducing any barriers to successful academic achievement. Furthermore, Universal Design for Learning (UDL) allows each institution to consider cultural sensitivity, bearing in mind the specific students who would be using this toolkit, and to ensure adequate support materials are made available where appropriate. For example, Unit 10 was developed based on the precise needs of VMs at the University of Bradford, whilst the fact that this was an optional unit allowed Spain

to use it to cover more personal issues deemed pertinent to their target learner group.

To promote independent, meaningful learning, the type of technology tools on which to base the Toolkit and its activities was carefully assessed. The technology tools chosen, including Twitter, Padlet, LinkedIn, and so forth, offer several advantages. Firstly, they are all free, readily available, tried and tested by members of the development team and found to be intuitive to use and available internationally. In addition, wikis, blogs and podcasts enable learners to gain knowledge and understanding of topics and practices including personal, participatory and intercultural literacies, encouraging participation in collaborative activities which transcend geographical, cultural and linguistic boundaries.

Step 4: Utilise Methods, Media & Materials

The Toolkit is available via the institutional VLE and offers a fully online, asynchronous ,self-access, self-paced course. Each of the ten units offers language instruction/ practice of three hours, whilst the digital literacy offers one and a half hours per unit. The Toolkit offers a non-linear approach with opportunities for peer interaction as well as independent study and practice, and organises the units into key topics and skills allowing students to choose units of most interest or greater need.

The choice of digital tools depended on the purpose of the activity. For example, communicative activities are best supported by the use of such tools as a wiki, email or blog. Other tools support the development of information skills, such as *Scoop It* and *Mendeley*. It is also useful to include the use of students' own tools, such as their mobile phones, in order to extend their confidence in using private technologies to develop their personal identity; in turn, this has been shown to be useful in helping students to bridge the gap between their current skills and the digital literacy skills required in the more formal education environment (Attewell, 2005).

Unit objectives are clearly articulated at the outset of each unit of the ten unit Toolkit. These are not expressed in terms of "students will be able to…" because the objectives are not directly linked to any form of assessment. Instead, the objectives of each unit are laid out as specific language topics or skills, with exploratory tasks leading to student knowledge making and sharing, practice activities and final task completion which links the objective to a real world task which students may need to complete. For example, in Unit 1 the language outcome is simply expressed as "to give advice / make suggestions". The activity then involves peer engagement in the creation of a wiki using the target language where appropriate and making suggestions regarding rules of netiquette for the online group. If students complete the task and use the target language, the objective has been achieved.

This highlights the language aspect of the Toolkit whereby key language functions are presented with support materials and then tied into relevant interactivities utilising a range of media resources and tools to meet the Digital Literacy aims of the toolkit.

Each unit opens with a clear language focus, link to the content, indication of student tasks and digital skills focus. There is also an additional folder with optional

support materials for each unit. There is also a minimal requirement for tutor presence in the Toolkit which was a result of limited funding but which could easily be adapted according to each institution's needs and tutor time available.

To accommodate the differing needs of VMs and tutors supporting the online toolkit, two versions of the toolkit were created- one which only shows what the learner needs to see, the other aimed at tutors including tools which may need to be set up in advance on the VLE and links to useful guides etc. Tutors can also add or remove items which are of more / lesser interest to their specific group of learners. In addition, a Toolkit Overview shows everything on one page for anyone to view.

Step 5. Required Learner Participation

This was a key aspect of the ASSURE model which reflects the need for student participation. The tasks in the ten units require the completion of both independent and shared activities across a variety of undertakings to engage diverse learners. Many of these tasks can be tailored to the particular academic interest / discipline area of each student, allowing for and thus motivating learners as they recognise the relevance of the activities and materials (Bocchi et al., 2004). Both the JISC Digital Capabilities Framework and the Universal Design for learning models support this focus on learner participation and encouraged the team involved in the Toolkit design and creation to consider a range of activities, tools and delivery methods to ensure language and digital literacy skills were promoted via engagement which would be of direct value to the learners.

Step 6. Evaluate + Revise

The first version of the Toolkit programme was shared on an online platform by all project members; an online feedback form was then completed to suggest revisions / additions /deletions. This led to a revised version of the toolkit.

2.3 Piloting

The version of the Toolkit developed during this phase was piloted in two stages:

Pre-pilot stage

- For each topic, the teams from countries with a language other than English (Finland, Slovenia and Spain) provided an additional set of support resources for learning the language of instruction in Slovenian, Finnish, Spanish and Catalan.
- Two members of each of the participating teams tested the Toolkit independently across all units and evaluated it against pre-established criteria that assessed the relevance and use of each of the units, as well as the time needed to complete them. To facilitate this, a pilot feedback sheet was created, similar to the one used in the co-production phase.

- A new version incorporating the feedback and a Toolkit overview were created. The English only and the adapted versions (Finnish, Slovenian, Catalan and Spanish) were uploaded to the institutional VLEs .

Pilot stage

27 VMs recruited earlier via email and a face to face meeting were asked to pilot the Toolkit and to complete an anonymised questionnaire. The project obtained authorisation from each of the ethics committees at each of the project's participating organisations.

2.4 Ethical Considerations

All the individuals and institutions that participated in the recruitment of respondents agreed to the study protocol in advance and signed consent forms. In addition, participant anonymity and data confidentiality were maintained at all times.

2.5 Evaluation

Firstly, to characterise the sample of participants in the study, the questionnaire included a series of questions designed to collect their sociodemographic data.

Then, to assess the usefulness of the Toolkit in achieving the target digital and linguistic competences, the students answered 10 Likert-type questions on a five-level scale of agreement. These questions assessed the perceived usefulness of L2L DL & LT for improving writing skills, reading skills, digital research skills, speaking and listening-notetaking in an academic context as well as helping VMs to connect to information and people, to use online collaboration tools and services, to use social networks for educational purposes, to create new content with digital media and tools, and to collect, shape and organise online content on a specific topic.

In addition, the students were asked about their impressions of the toolkit through the following open questions:

Please, think about L2L English language & Digital Literacy Toolkit for higher education refugee students who begin their studies in the host country and tell us...
What did you like more?
What would you change?
Have you had any problems during the tool-kit evaluation? If yes, please specify what kind of problems:

2.6 Results analysis

The median and interquartile range were used to describe the quantitative variables with categorical variables presented as percentages.

The answers to the open-ended questions included in the questionnaire were subjected to a thematic content analysis. They were analysed first individually and then jointly by the researchers. After several readings, paragraphs were segmented and codes assigned to them following an inductive strategy. Further analysis allowed the codes to be grouped into three thematic categories, *Strengths of the Toolkit*, *Major Changes*, and *Minor Changes*.

3 Results

Twenty-one students (eight women / 13 men), completed the piloting and evaluation process. Among them, three vulnerable migrant students in Finland, five in Slovenia and nine in Spain also assessed the resources and content oriented towards learning the local language of the respective host country. The median age of the participants was 28 years, with a minimum of 20 and a maximum of 49 years. Details of the sample characteristics are presented in Table 1.

The results of the evaluation of the usefulness of the Toolkit in improving the 10 target digital and linguistic skills are presented in Fig. 2 below:

The key findings illustrated in the table above show that an average of 78% of students agreed or strongly agreed that the Toolkit aims were met.

With reference to improvement of Language skills,

- Academic Writing (qu 1): 81% agree or strongly agree that the Toolkit is helpful
- Reading (qu 2): 81% agree or strongly agree
- Listening and Speaking for successful notetaking and seminar engagement (qu 4): 67% agree or strongly agree.

The digital literacy skills of collaboration, creativity and content curation also receive positive feedback (qu 3, 5-10). For example, 95% of respondents agree or strongly agree that the Toolkit helped them to evaluate online resources and improve digital research skills, whilst 76% and 90% respectively (qu 5 and 7) are positive about the impact on their collaboration abilities and 62% (qu.9) agree that it has benefitted their creativity skills. The response to content curation is encouraging, with 76% of respondents agreeing that the Toolkit aids with the collection, shaping and arrangement of online content related to a specific subject.

3.1 Open ended questions: Qualitative Data Results

The presentation of the data arising from the open-ended questions has been organised according to the three thematic categories that emerged in the analysis.

Table 1 Demographic data

		N	%
Sex distribution	Both sexes	21	100,0
	Females	8	38,1
	Males	13	61,9
Country of origin	Turkey	2	9,5
	Syria	9	42,9
	South Korea	1	4,8
	South Africa	1	4,8
	Republic of Kosovo	1	4,8
	Poland	1	4,8
	Japan	1	4,8
	Iran	1	4,8
	Greece	1	4,8
	Bulgaria	1	4,8
	Bosnia and Herzegovina	1	4,8
	Prefer not to say	1	4,8
Country where participants used to live before reaching the current country of residence	Turkey	2	9,5
	South Korea	1	4,8
	South Africa	1	4,8
	Republic of Kosovo	1	4,8
	Poland	1	4,8
	Nigeria	1	4,8
	Lebanon	9	42,9
	Iran	1	4,8
	Greece	1	4,8
	China	1	4,8
	Bulgaria	1	4,8
	Bosnia and Herzegovina	1	4,8
Current country of residence	Spain	9	42,9
	Slovenia	5	23,8
	Ireland	1	4,8
	Greece	1	4,8
	Finland	3	14,3
	England	1	4,8
	Prefer not to say	1	4,8

Table 1 (continued)

		N	**%**
Mother tongue	Turkish	2	9,5
	Polish	1	4,8
	Persian	1	4,8
	Kurdish	2	9,5
	Korean	1	4,8
	Japaneesse	1	4,8
	Greek	1	4,8
	English	2	9,5
	Bulgarian	1	4,8
	Bosnian	1	4,8
	Arabic	7	33,3
	Albanian	1	4,8
Educational level currently estudying	PhD	2	9,5
	Master	5	23,8
	Degree	13	61,9
	Another level	1	4,8
Field of studies currently undertaken	Technical studies	4	19,0
	Social sciences and humanities	4	19,0
	Health sciences	6	28,6
	Experimental sciences	1	4,8
	Artistic studies	1	4,8
	Another studies	5	23,8

3.1.1 Strengths of the Toolkit

Fourteen students provided concrete feedback acknowledging the strengths of the Toolkit. In general, they highlighted its value in acclimatising them to online study and developing their linguistic, academic and digital literacy skills.

Linguistically, the Toolkit's helpfulness for learning different languages was recognised:

how many languages you can learn from the same website!

An additional benefit of the toolkit was highlighted for improving their note-taking skills (two mentions), academic writing skills (five mentions), critical reading skills (three mentions), and helping to search for, select and organise information in a digital environment (three mentions). With reference to digital literacy skills development, students indicated that the security in managing
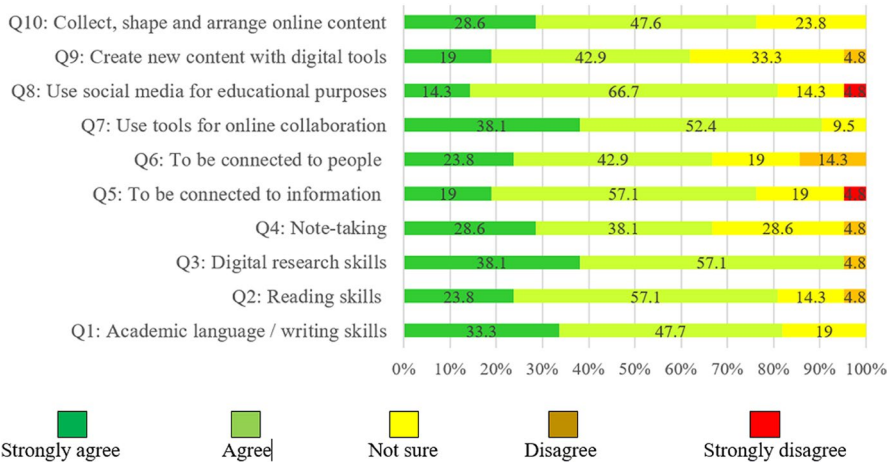
Fig. 2 Evaluation of the Toolkit Usefulness in the achievement of the digital and linguistic competencies (%)

digital identity unit (three mentions) and the guidelines on how to write formal emails (mentioned twice) were very useful.

Further points of note were that students praised the toolkit structure, organisation of resources and the usefulness of the content. In addition, the explicit recognition of the variety of materials was clearly noted, especially the videos and tutorials on various topics (eight recognitions) and the easy navigation and clear distribution of the content (five mentions).

Perhaps of key importance is the evaluation of one student currently undertaking a PhD who identified the Toolkit's positive impact on improving self-esteem through building student confidence in the academic environment:

I have done three previous degrees in UK, however, even if I am now doing a PhD which is higher level, all the information provided, from how to create a Linked-In account, to how use academically the proper style of language, or to how to networking, up to the point of learning how to do annotated bibliography, all are brilliant and really amazing. I am so sad I didn't know about L2L Toolkit when I started my degrees. With Greek being my nationality and English not being my first language, I struggled a lot, with insecurity, or how to write an academic email, well even that is information provided by L2L Toolkit, and it really helps refugee students to build confidence and self-esteem. I am seriously impressed.

3.1.2 Major Changes

Sixteen students responded, with half of them expressing satisfaction and proposing no changes. The other eight highlighted the benefit of using video with four suggesting more video tutorials be included:

I wouldn't change a single thing. Maybe add more videos or even YouTube videos, because some students help them better to learn from videos.

In some cases, the need to include further interactive materials was mentioned (two mentions) and one student requested additional host country language learning resources (Slovenia) with another suggestion for a more user-friendly interface .

The workload of the Toolkit is one of the discrepant aspects of its evaluation, since two students would add more units and resources while one of the participants complained about the large amount of work that the instrument required:

no problems, but a lot of different tasks, not sure if I have time to work on those tasks.

Finally, one student proposed adding a discussion forum for news or questions.

3.1.3 Minor Changes

Of the 14 responses concerning problems encountered, 12 students said they had encountered none. Regarding minor changes, the suggestions were generally limited to identifying a few broken links and other small glitches.

One of the students mentions non-academic concerns not being addressed by the Toolkit:

Tool-kit evaluation is perfect, but some of the things we expected to see are not included. The kits was perfectly constructed to educate in academic use of languages, and media usage for learning. However, it lacks some road map, vulnerability assessment, Bus within [urban] and inter bus availability, assessment lacked, information is well provided, lacking mental assessment information, time is not provided.

This clearly relates to non-academic language/ information needs and could be addressed by individual institutions in response to such needs.

4 Revision

In response to the above, the Slovenian version of the Toolkit incorporated more resources for learning the local language, mainly in video format, for both academic and non-academic contexts.

The workload was not altered but more clarity around the ability of students to select what is most appropriate to their needs was added. Moreover, the version of

the project as presented in the 2018 Erasmus+ call specified the estimated duration of the course at 30 hours, including 10 hours of personal work, and this was deemed appropriate time allowance when it was piloted.

Other revisions included damaged links being repaired and although the team considered including a free access forum, this was not implemented due to its need for tutor moderation. Individual organisations can modify this according to their particular students' needs and staffing availability.

The final version of the tutor, the student guide and several images illustrating the design, methodology and final graphical interface of the toolkit are available for consultation as supplementary information (SI1, SI2, SI3).

The Toolkit is available under Creative Commons licence CC BY-NC (Creative Commons, 2020) in moodle course format and can be visited as a guest at the following address: https://campusvirtual.urv.cat/course/view.php?id=79628 entering the password "L2LIO1". The toolkit is also available on the same terms (CC BY-NC) on the project's web-hub *Learning to Live and Work Together: Improving the Quality of Life for Vulnerable Migrant Students through Integrated Digital Technology Enhanced Support and Transformative Action in Higher Education,* available at this link https://learningtolive.eu/course/english/

5 Discussion

This Toolkit was created to provide vulnerable migrant students with the language and digital literacy skills required for successful study at higher education institutions in the European Union. Using the ASSURE instructional design model, the UDL and the JISC Digital Capability framework allows for a clear structure which encompasses the use of technology for teaching and learning, focuses on learner needs and adheres to priority issues of inclusion and diversity. With all three models underpinning its development, the Toolkit offers a well-structured, flexible, interactive experience adopting varied methods of representation and options for engagement to encourage independent and networked learning.

Our starting point was a search of the literature which recognises attention to refugee higher education as a strategic issue for post-conflict recovery and peace-building (Avery & Said, 2017) and has even been considered by the United Nations High Commissioner for Refugees as a basic human right (UNHCR, 2012). Despite this, much of the attention and research focuses on primary and secondary education (Avery & Said, 2017; T.M. Crea & McFarland, 2015) or is aimed at lower level language learners. Our project makes a modest but necessary contribution to this challenge by research into innovative approaches which exploit digital technology to encourage VM academic achievement and well being. In addition, and from the specific perspective of the Toolkit content, our project addresses specific needs identified as barriers to refugee students' access and success in higher education, namely the need for English language proficiency in reading, writing, listening and speaking appropriate to their academic context alongside the ability to speak the local language of the host country.

A further consideration was the use of technology, recognised as a valid strategy to facilitate refugees' access to, and success in, higher education, even in circumstances of minimal technological infrastructure (Halkic & Arnold, 2019). Hence, the format of the Toolkit and its open access publication. Despite the advantages of technology as a support for learning, navigating and studying through the virtual campus of universities has a specific culture. As such, it requires advanced skills recognised as a difficulty for the access and success of refugee university students (Bajwa et al., 2017). This has guided the content and objectives aimed at developing the digital literacy of the students targeted by this toolkit which presuppose a basic level of technological skills.

In addition, because cultural sensitivity has proven to be a requirement in distance learning contexts targeting vulnerable migrant learners (T.M. Crea & Sparnon, 2017), the Toolkit we present here, based on the use of resources of international reach, applying the UDL framework, available in open-access and framed in a flexible learning environment, is supportive of delivering culturally- sensitive content.

Moreover, as a main contributor to student success is student participation, the Toolkit embeds interactive tasks throughout the units to minimise dropout and improve learning outcomes (Finn & Zimmer, 2012). In addition , certain activities develop independent learning, identified as a motivational improvement strategy (Lee et al., 2015). These factors have been a consideration at each stage of the Toolkit development, as has the practice of explaining the rationale behind tasks and offering varied and optional learning activities which allow students to feel that the activities are personally relevant and meaningful, thereby promoting commitment to online courses (Lee et al., 2015). In our case, the challenge was to keep the material accessible (mainly at CFER levels B1/B2) with tasks which demand interactivity to complete problem-solving activities through individual and shared engagement and to evidence the successful application of new concepts to build on previous knowledge for each student (Palloff & Pratt, 2003). With both language and digital literacy activities, students were presented with scaffolded learning tasks and model video/audio/text guides to encourage more confident and self-directed learners and to enable students to become co-authors and co-creators of relevant materials and activities.

Furthermore, and in line with Rogers' theory of diffusion of innovations (Rogers, 1995), the Toolkit works by introducing an innovation (i.e. a new technology tool) which some VMs readily adopt. This new behaviour renders early adopters influential in group decision-making and has been shown in this project to encourage other less confident VMs within the cohort to adopt these innovative ideas and practices themselves, with the result that doing things in a different, more appropriate or innovative way becomes the individual and/ or group norm.

It is worth noting that one student pointed out that the usefulness of the Toolkit could reach beyond improving the academic, linguistic and digital skills required of a university student and extend to the field of personal well-being through improved self-esteem arising from the construction of self-confidence in an unfamiliar context. This provides confirmation that the Toolkit is not only meeting its aims of developing the language and digital literacy skills of our VMs, but also contributing

to improving their psychological wellbeing, a link to the overarching aims of the L2L project and covered in detail via the mobile app (Project Output 2).

Although only one student mentioned the lack of content related to dealing with everyday issues, this is of importance in that it raises issues of concern for VMs beyond academic matters which could impact on a VMs rate of success in HE; however, these can and should be managed by individual institutions and are beyond the remit of this Toolkit.

Overall, the results of the evaluation validate the instrument for the purposes for which it was created and show a positive response to skills development activities and resources. The variety of materials, ease of browsing and the clear preparation and structure were the most praised formal aspects, with encouraging feedback on the units which covered online identity security, resource evaluation, writing skills and critical reading. The above present a decisive response indicating that the Toolkit is fit for purpose and fulfils its aims.

Finally, in accordance with the Association of Commonwealth Universities (2019), it is vital that professionals engaged in improving the access to and the experience of vulnerable migrant students in higher education share good practices and create collaboration networks. Therefore, access to the final version of the Toolkit is available under the Creative Commons CC BY-NC licence (Creative Commons, 2020). This licence lets others remix, adapt, and build upon the work non-commercially, and although their new work must also acknowledge the first author and be non-commercial, they are not required to license their derivative works under the same terms. The dissemination of the Toolkit in open access is key to facilitating the exchange of best practices and the networking of all those involved and, thereby, optimising the potential of its use.

6 Limitations

The low response rate to the request to evaluate the Toolkit has meant that the sample of users who evaluated it is too small to draw any definitive conclusions. However, this first evaluation provides an initial impression of the validity of the Toolkit.

All versions of the Toolkit evaluated had a common substrate aimed at digital literacy and improving language skills in an academic context. Some versions additionally contained a diverse, local component geared towards the learning of local languages. This detracts from the evaluation of the local component of the Slovenian, Finnish and Spanish versions, which were only reviewed and evaluated by five, three and nine vulnerable migrant students, respectively. Therefore, the evaluations of the local components of these versions should be interpreted with caution. In order to draw conclusions as to its validity, there will be a need to await users' new evaluations once its use has become generalised.

Because the Toolkit utilises free online digital tools, the material will need to be regularly updated; as such, the research team considers the systematic review of the contents, resources, tasks and, even of the objectives, crucial, if changes in the environment so require. Such a review will, of course, incorporate the suggestions of users who will periodically be asked for their opinion on the usefulness of the

Toolkit. To this end, the final version of the course incorporates a survey in which users are asked to provide their perception of the usefulness of the different units for improving their language and digital skills, as well as the contribution of suggestions for improving the Toolkit. The provision of a space that facilitates and promotes the contributions of the students themselves as a strategy for continuous improvement fits perfectly into the philosophy of a project that has, at all times, considered the value of co-creation and bi-directional contributions as a means of ensuring a viable output.

Lastly, given that the Toolkit has only been evaluated by students, it would seem pertinent for a similar evaluation by tutors to occur.

7 Conclusions

The cycle of co-design, co-production, piloting, evaluation and revision has proved useful for the creation of an Integrated Digital Literacy and Language Toolkit for vulnerable migrant students in higher education. The resulting version of this first creation cycle is the end result of input from the various actors involved in using the Toolkit.

Beyond the contents of the Toolkit, the most noteworthy aspects that determine its usefulness in distance learning contexts targeting vulnerable migrant students are: support for student autonomy, improving digital literacy capability and academic language ability for learners, encouraging safety within the online environment, offering a flexible learning framework, access to open resources of international scope, and its dissemination under Creative Commons licence.

Declarations

Ethical considerations The project obtained authorisation from each of the ethics committees at each of the project's participating organisations.

All the individuals and institutions that participated in the recruitment of respondents agreed to the study protocol in advance and gave their consent to participate in it.
Participant anonymity and data confidentiality were maintained at all times.

Conflicts of interest/Competing interests Neither author has any competing interests in the publication of this study.

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