Basic digital competences for unemployed citizens: conceptual framework and training model

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Abstract: Digital competence is a transversal key competence increasingly required by the labour market as well as by the job search process itself, most of which has now shifted online. Individuals who have not developed the most basic digital technology skills are most at risk for long-term unemployment. We argue that to bridge the skills gap of digitally-excluded, unemployed citizens we should create a common understanding of what are the most essential digital competences they require, in particular, to solve their job seeking problems. The resulting conceptual framework should aim to facilitate the design of an elementary but comprehensive practical learning programme through which adult learners can readily develop self-efficacy using digital technologies. To fulfil this need, we provide a holistic
framework within which ten essential digital competences for unemployed citizens are identified and contextualised. It is grounded on an analysis of generic digital competence frameworks and existing employability-enhancing digital training initiatives. The applicability of this new “basic digital competences” framework was tested using an iterative process of evaluation with practitioners involved in programmes for the unemployed, and through the design of a challenge-based learning project that provides a practical training model for the implementation of the framework in an integrated and transversal manner.

Subjects: Adult Education and Lifelong Learning; Educational Research; Emotional & Behavioural Difficulties; ICT; Careers Guidance; Theories of Learning; Study Skills; Continuing Professional Development; Technology in Education; Citizenship

Keywords: basic digital competences; digital job seeking; employability; conceptual framework; training model

1. Introduction
The exclusion of citizens from an increasingly digitalised labour market calls for the creation of new theoretical and practical understanding of the skills they need to develop employability.

1.1. The digital skills gap and employability
Digital skills are of critical importance for accessing the labour market (DG Connect, 2017a; European Commission, 2016). Yet, in 2017, 35% of the EU labour force (employed and unemployed) lacked even basic digital skills (DESI, 2018). In an environment of fast-increasing digitalisation, this digital skills gap implies serious risks of exclusion and long-term unemployment as digital skills become a prerequisite, not only for entry into many jobs, but increasingly for the job search itself. The days of looking at job ads in newspapers are over, while the internet has become the central resource, with employers and candidates alike turning to online platforms and tools (ESCO, 2017). Unemployed citizens, however, frequently lack confidence in their digital job-seeking skills and are challenged by such tasks as creating a professional CV, using email to contact potential employers, or filling out an online job application (Smith, 2015). To a large extent, a jobseeker without the ability to perform these everyday basic digital tasks won’t even get a foot in the door (Bradley et al., 2017). And the longer the period of unemployment, the greater the psychological and social impacts tend to be (SELFEE, 2018a). Bridging the basic digital skills gap currently faced by the labour force, especially the long-term unemployed citizens, is therefore essential for a more inclusive digital economy and society.

1.2. Reducing the digital skills gap faced by unemployed citizens
In Europe, 88% of workplaces have taken no action to remedy their employees’ lack of digital skills, despite the fact that numerous initiatives for boosting the digital skills of the labour force are in place at European level, especially in the context of employment (DG Connect, 2017b, n.d.). These generally implement the European DigComp Digital Competence framework, the main objective of which is to create a common understanding of the digital competences required for citizens to fully participate in today’s knowledge-based, digital society (Carretero et al., 2017). They are therefore based on a case-by-case interpretation of a conceptualisation not specifically intended for the unemployed. This approach may respond to some of the most essential learning needs of unemployed citizens, but practitioners wishing to design comprehensive digital literacy training for the unemployed lack a specific, holistic, common conceptual framework upon which to base an effective intervention. This is compounded by the fact that the needs of job-seeking learners may differ from those of adult learners whose primary motivation is to learn digital literacy skills (Withers et al., 2015). Moreover, the DigComp framework is deficient in critical areas such as the fundamentals of familiarity with hardware and software (Antoninis & Montoya, 2018). A conceptual reorganisation of basic digital competences therefore needs to go beyond the identification of the relevant subset
of the wide range of competences covered by DigComp. The resulting framework should provide a basis for digital literacy training which has relevance for its end-users (adult job-seekers), as well as enable them to develop self-efficacy using digital technologies.

1.3. Toward a common understanding of the most essential digital competences for unemployed citizens

A common understanding of the most essential digital competences for unemployed citizens is needed to facilitate the design of efficient, practical training interventions. Digital competence is one of the eight domains of key competences for lifelong learning defined by the European Commission (2018). Key competences include knowledge, skills, and attitudes (Vuorikari et al., 2016) needed by all for personal fulfilment and development, employability, social inclusion and active citizenship. Digital competence clearly involves more than knowing how to use devices and applications. It consists of (a) technical digital technologies skills, (b) the ability to use digital technologies in a meaningful way for working, studying and other everyday activities, and (c) the ability to critically evaluate digital technologies. The sensible and healthy use of digital technologies also requires the acquisition of knowledge and attitudes regarding the legal, ethical, privacy and security aspects, as well as an understanding of the role of digital technologies in society and a balanced attitude towards technology. Bearing in mind the rapidly-evolving nature of digital technologies, digital competence requires the ability to learn about digital technologies by using them, choose the right technology, and do so confidently (Guitert Catasús et al., 2015).

According to Martin and Grudziecki (2006), we can regard digital competence, as conceptualised by the European Commission, “as an underpinning element in digital literacy. In moving from competence to literacy, however, we take on board the cruciality of situational embedding. Digital literacy involves the successful usage of digital competence within life situations”. “Not only must you acquire the skill of finding things, you must also acquire the ability to use these things in your life” (Gilster, 1997).

Rather than limit our thinking about digital literacy to a singular all-inclusive definition, it is better to think of it from a sociocultural perspective in terms of diverse “digital literacies” (Brown, 2017). Digital literacies are context dependent and socially negotiated, and exist on a procedural-to-critical spectrum (Belshaw, 2017).

When developing a training intervention programme, we should view digital literacies within a larger frame that emphasises mobilising and building on what learners acquire and know from their wider cultural participation and affinities (Knobel & Lankshear, 2006). Despite the peculiarities of the specific context, however, a number of independent, universal features of digital literacy exist that must be identified. These tend to be associated with information retrieval, analysis and potential problem-solving, all of which are usually required in everyday activities (Cartelli & Giovannella, 2015).

When defining basic digital competences for unemployed citizens, therefore, it is useful to think about both the universal (DigComp competences for citizens) and specific (unemployment and job-seeking situational embedding, everyday activities) features of the resulting practical learning programme.

1.4. A practical conceptual framework

The aim of this study is to develop and test a practical conceptual framework that can be applied to solving job-seeking problems. It is intended to simplify both trainee engagement with the digital world and trainers’ use of active learning methodologies (Hackathorn et al., 2011). To ensure that job-seeking adult learners have the opportunity to engage in the digital literacies that are most useful to them, emphasis should be placed on active, learner-centred andragogical approaches that focus on direct, first-hand experiences and aim to help trainees develop a sense of mastery (Knowles et al., 2012).
This specific framework should fulfil two main specific objectives:

1. identify a set of essential basic digital competences for unemployed citizens;
2. enable the design of an elementary, comprehensive, competence-based, practical learning programme for unemployed citizens oriented toward solving common job-seeking problems.

Two key questions were therefore asked:

Q1: What digital competences are essential for unemployed citizens?

Q2: How should a practical training intervention be designed to facilitate acquisition of the competences as defined by the novel conceptual framework?

2. Methodology

The two key questions of this study were researched using a design-based approach that made use of the ADDIE model of instructional design as an overarching methodological framework (Bichelmeyer, 2005). Design-based research (DBR) is a way to test and refine educational designs based on principles derived from prior research. It intends to advance theory and at the same time to increase the impact, transfer, and translation of education research into improved educational practices (Anderson & Shattuck, 2012; ECRM, 2019; Poce et al., 2019). According to Reeves (2006), critical characteristics of DBR includes (1) Analysis of practical problems in real contexts by researchers in collaboration with practitioners, (2) Development of solutions informed by existing design principles and technological innovations, (3) Iterative cycles of testing and refinement of solutions in practice, and (4) Reflection to produce "Design principles" and enhance solution implementation. The ADDIE model has been previously applied for guiding DBR (ECRM, 2019; Poce et al., 2019; Rodríguez Fernando & Martínez Juan, 2017). With its five iterative phases (Analysis, Design, Development, Implementation and Evaluation), the ADDIE model provides a useful, generic, systems-oriented design process applicable to creating effective training programmes as well as achieving several different ends in information literacy instruction (Centeno Alayón, 2017; Nichols Hess & Greer, 2016). ADDIE both describes what happens and prescribes what needs to happen (Branch, 2009). It fits in with DBR because they both share fundamental principles (ECRM, 2019). Following this intentional and iterative methodological DBR process guided by ADDIE gave researchers and practitioners in this study a well-suited structured approach and essential feedback for conceptualising, creating and testing refined versions of the Basic Digital Competences Framework for Unemployed Citizens herein presented, and its implementation as a training model incorporating enhanced design principles and praxis (Figure 1).

(A) Analysis. The first phase in the conceptualisation process was based on a literature review in search of existing digital literacy frameworks and employability-oriented initiatives. This review aimed to identify conceptual and practical needs as a basis for the initial prototyping of a conceptual model map which responded to those needs. The searches were conducted as follows (similarly to Ferrari, 2012):

- Previous Catalan and European projects on the subject, conducted at the UOC;
- A review of international organisations' projects/reports;
- A review of EU reports and initiatives related to both digital competence and employability.

These searches resulted in the selection and further analysis of the following:

- ACTIC: Accreditation in ICT skills (ACTIC, n.d.; Ferrari, 2012; Kluzer, 2015)
- SOC: Training for unemployed people in Catalonia (SOC, 2009)
- CRIS: Conceptual framework on digital competences in primary and secondary schools in Europe (Baztán et al., 2017)
The following criteria were applied to analyse the selected items:

- Main competences developed within selected frameworks and employability-oriented initiatives;
- Coherence of vision and competences developed within each framework;
- Substantial differences and key similarities between selected frameworks;
- Identification of missing elements, if any, especially in relation to basic competences.

Analysis of conceptualisations and answers to questions resulted in the identification of tendencies, similarities and discrepancies, and identification of conceptual and practical needs.

**D) Design.** The analysis results served as a basis for mapping the competences in the initial design of a conceptual map, in which the main competence areas and relative distribution were defined, then adapted in response to evaluation by experts in digital competence and employability.

**D) Development.** To reach a level of definition sufficient for implementation, the initial conceptual map was further developed into a conceptual framework through a process of iterative feedback with a focus group of practitioners, through which each framework competence was defined in greater detail in the context of job seeking (including competence areas, competences, and indicators).

The members of the Practitioners focus group belonged to the European-funded SELFEE project, which creates new education programmes and tools designed to help long-term unemployed
citizens (end-users of SELFEE digital literacy training) develop a combination of the skills they most lack for reintegration into the labour market: social and emotional skills (SEL), digital competences and practical job-seeking skills (SELFEE, 2018b). This group, which included trainers of job-seeking unemployed adult learners, offered a perspective from a multicultural labour market and contextualised feedback for improving applicability of the framework.

Practitioners from the focus group were involved in the practical testing by means of diverse interventions. In the first place, they were involved in online discussions on the first draft of the conceptual model map, whereby they provided comments and suggestions on the initial mapping of digital competences that were integrated into an improved version. Then interventions debated the definition of a common digital training programme. Secondly, the validation process was expanded by means of a workshop for practitioners from the focus group, using a proof-of-principle/design implementation approach to test the framework’s applicability to practical situations, with practitioners designing their own, contextualised training interventions.

During this workshop, a key output for the project, the newly drafted “Digital literacy for job search” handbook for trainers was presented (SELFEE, 2018c), in two stages (with a total duration of about 6 hours):

- (1) The theoretical framework on digital literacy and the methodological background on which SELFEE trainers can base their job-search training interventions;
- (2) A set of practical guidelines for assisting trainers in their contextualised application of the digital literacy framework, including practical guidelines and hands-on activities for long-term unemployed citizens, the end-users of the SELFEE digital literacy training programme.

Before and during the workshop, the practitioners were provided with the most advanced version of the theoretical framework on digital literacy and the methodological background on which to base job-search training interventions. As a first intervention in the implementation process, with the assistance of practical guidelines and using the challenge-based learning methodology (Nichols et al., 2016), they applied the Basic Digital Competences Framework for Unemployed Citizens to the design of a competence-oriented training module.

(II) Implementation. In their own setting, trainers from the focus group performed a second round of implementation by running a workshop for two groups of end-users (trainees) comprised of unemployed citizens located in Amsterdam and Barcelona, respectively.

(E) Evaluation. As mentioned above, the iterative process of validation of the framework was initiated with an evaluation of the initial conceptual map by five experts in digital competence and employability. This was done using an online questionnaire, “Basic digital competences for unemployed citizens—Expert validation of conceptual framework”, whereby experts responded to closed- and open-ended questions on each of five areas, eleven competences, and the map as a whole, evaluating the relevance and formulation of each item. The experts could use general comments to propose changes in case of disagreement with an item (see Supplemental Material 1).

Subsequently, the framework was evaluated by practitioners from the focus group at various stages of its development and implementation. A third evaluation was performed by end-users (both trainees and trainers) to test the practicality of the selected set of basic digital competences for employability. Four trainers were asked to answer a questionnaire (see supplemental material 2) on the relevance and applicability of the improved framework. The trainees who took part in the workshops organised in Amsterdam (eleven trainees) and Barcelona (thirteen trainees) were asked to answer a questionnaire (see Supplemental Material 3) to evaluate the achievements and usefulness of the framework-derived training. An analysis of the end-users’ responses was used to define the final version of the framework presented in this study.
3. Results

The essential digital competences for unemployed citizens and the practical training intervention enabling the development of these competences were defined through three main phases.

3.1. Analysis of needs, design of initial conceptual map and evaluation by experts

Based on a literature review and analysis of DigComp implementations and initiatives aimed at enhancing employability or improving conceptualisations, we first defined/prototyped the areas of basic digital competences for unemployed citizens. As DigComp, this initial conceptual map of Basic Digital Competences was made up of five distinct Competence Areas (CAs):

- Competence Area 1: *Digital problem solving*;
- Competence Area 2: *Digital citizenship*;
- Competence Area 3: *Digital information seeking and organising*;
- Competence Area 4: *Digital content creation*;
- Competence Area 5: *Digital communication and collaboration*.

The map consisted of a set of basic competences relevant to each CA (for a total of eleven competences, a competence being defined as consisting of knowledge, skills, and attitudes; Figure 2). For example, the knowledge, skills and attitudes needed to use digital technologies to search, select and organise digital information and content belonged to competence area 3, “CA3—Digital information seeking and organising”.

In contrast to DigComp, the map included elements of conceptual and practical needs found to be critically missing in the existing literature, such as the fundamentals of familiarity with hardware and software, and all the basics needed for operational usage of the most common digital tools used to interact in the digital world.

For the sake of simplicity, and with the intention of combining elements of digital literacy development into a coherent whole, we incorporated a “Digital problem solving” competence area (CA1) into “Basic Digital Competences”. This area was conceived and represented as a nucleus of prerequisite competences for using the most common digital technologies (therefore including the fundamentals of familiarity with hardware and software), around which the other elementary CAs can orbit in a “Basic Digital Competences” field.

Similarly, we introduced a second nuclear CA, “Digital citizenship” (CA2), that deals with the basic knowledge, skills and attitudes needed to participate in society through online engagement. To contextualise this digital participation and offer situational embedding for the development of the Basic Digital Competences, we clearly defined a larger area or field encompassing all five CAs, within which the eleven basic competences are learned and applied, and digital literacy is developed through practice. We called this application field for unemployed citizens “Digital job seeking”. Digital job seeking refers to the context of the unemployed citizen’s environment and community, to which the Basic Digital Competences framework is applied for the solution of job-seeking problems, and is therefore the field of application within which digitally-excluded, unemployed adult learners can develop self-efficacy using digital technologies.

Five experts in digital competence and employability evaluated each of the five areas, the eleven competences, and the framework as a whole, producing a total of 175 answers (five experts, 35 answers each; see Supplemental Material 1). Disagreements (6) were concerned mostly with the formulation (5) and not the relevance of the competence (1, concerning Competence 4.1). Among the five disagreements on formulation, Expert 3 disagreed strongly with Competence 2.2. The remaining four disagreements concerned the formulation of Competence 1.1 (Expert 3), Competence 1.2 (Experts 3 and 5) and Competence 3.1 (Expert 2).
The evaluations of Experts 1 and 2 on the formulation of Competence 2.2 led to the reformulation of Competence 2.2 (following suggestions provided by Experts 1 and 3), and to changing the order of Competences 2.2 and 2.3. Similarly, the common concerns of Experts 1, 3 and 5 led to the

**Application field:** ‘Digital job seeking’

‘Digital job seeking’ refers to the context of one’s environment and community to which ‘digital competence’ is applied for the solution of job-seeking problems, and is therefore the field of application within which digitally-excluded, unemployed adult citizens develop self-efficacy using digital technologies.

**Competence area 1: Digital problem solving**

Identify digital competence needs, appropriate digital solutions, solve technical problems, define a professional plan and develop self-efficacy using the most common digital technologies.

1.1. Using and configuring the most common digital solution systems.

To know the basics needed for the operational usage of the most common digital tools utilized to interact in the digital world.

1.2. Applying digital solutions to identified needs.

To understand where one’s own digital competence needs to be improved or updated for employability purposes. To identify needs and select an appropriate digital solution and apply it.

1.3. Solving technical problems.

To develop self-efficacy using digital technologies for detecting and solving technical problems.

**Competence area 2: Digital citizenship**

Build a personal and job search-oriented online presence, personal and data protection, engage in citizenship.

2.1. Developing digital identity with privacy.

To develop and protect a personal and job search-oriented digital identity.

2.2. Protecting data and digital systems and using digital technologies ethically and responsibly.

To protect personal data and digital systems. To be ethical and responsible when publishing content using digital technologies.

2.3. Engaging in citizenship using digital technologies.

To develop self-efficacy using digital technologies for taking active part in social interactions.

**Competence area 3: Digital information seeking and organising**

Search and select relevant job opportunities through digital technologies, organise digital information and content.

3.1. Seeking digital information.

To search and select digital information and content (e.g. texts, pictures, videos, web pages, etc.) relevant to personal and job search needs.

3.2. Organising digital information.

To organise, store and retrieve information and content in digital environments.

**Competence area 4: Digital content creation**

Create and edit job search-oriented digital content in different formats using the most appropriate digital technologies.

4.1. Developing digital content.

To produce and edit basic digital content in different formats. To treat textual, numerical and/or audiovisual information appropriately based on the possibilities of the tool and with a format adapted and coherent with the job search objective and the audience.

**Competence area 5: Digital communication and collaboration**

Interact in digital environments, present oneself to employers, share content and collaborate through digital technologies.

5.1. Communicating through digital technologies.

To interact properly (in a manner that reinforces and not undermines self-presentation) through appropriate digital technologies in a variety of forms, ways, and contexts, adapting dynamically to specific employment opportunities.

5.2. Collaborating through digital technologies.

To interact using collaborative virtual environments. To share digital information and content using the most appropriate digital tools and means.

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Figure 2. Conceptual map of the “basic digital competences” for unemployed citizens.
reformulation of Competence 1.2, following suggestions provided by Experts 1 and 3, as well as to
the inclusion of more indicators, as suggested by Expert 3. Altogether, four of the six disagree-
ments were addressed by these modifications to the framework. Since the remaining two dis-
agreements corresponded to isolated opinions not shared by several experts, Competences 1.1
and 3.1 remained unchanged, as did the other competences agreed upon by all the experts. No
major changes were therefore applied to the conceptual map, since the relevance of the areas and
competences were only marginally questioned. The single disagreement on relevance, in relation
to Competence 4.1, was responded to by providing more indicators, following Expert 3’s sugges-
tion. Indicators were also added to all eleven competences as a first key transition step from the
conceptual map to a first version of a complete framework.

3.2. Development of a first full version of the framework and implementation proposal of
a practical training model by focus group
In addition to the modifications suggested by experts, in its development phase, the first version of
the framework received various inputs from the members of the Practitioners focus group (see
Methodology Section). These led to an enriched, more practical, contextualised, and employability-
oriented prototype, as shown in the example of competence area 1 (Table 1).

The proof-of-principle implementation approach used during the workshop with the practitioners
from the focus group led to the definition of a model that applied the Basic Digital Competences
framework to the design of a competence-oriented practical training programme for unemployed
citizens (Table 2). The challenge-based learning methodology used for solving five real-world
employability and digital job-seeking problems allowed for an unconstrained, contextualised and
transversal distribution/achievement of the eleven digital competences of the framework into the
learning activities.

| Table 1. First version of the “basic digital competences framework for unemployed citizens”— example of competence area 1 (for the remaining four areas of framework 1, see supplemental material 4) |
|---|
| **Competence area 1: Digital problem-solving** |
| Identify digital competence needs, appropriate digital solutions, solve technical problems, define a professional plan and develop self-efficacy using the most common digital technologies. |

| 1.1 Using and configuring the most common digital solution systems. |
|---|
| To know the basics needed for the operational usage of the most common digital tools utilized to interact in the digital world. |

| 1.1.1 Understand the basic ICT concepts of hardware, software applications and networks. |
| 1.1.2 Be aware of the most commonly used digital devices and applications and how they can help solve job-search problems. |
| 1.1.3 Use a digital device and Internet (Control the Computer with your Keyboard, Mouse or Trackpad) |
| 1.1.4 Configure digital environments depending on personal needs (e.g., accessibility, settings, etc.). |

| 1.2 Applying digital solutions to identified needs. |
|---|
| To understand where one’s own digital competence needs to be improved or updated for employability purposes. To identify needs and select an appropriate digital solution and apply it. |

| 1.2.1 Be aware of the possibility of the existence of unknown tools for helping define professional/employment future (ex: competence map, online questionnaires to define motivations, strengths, skills, etc.), and be able to identify and use the appropriate digital solutions for specifics tasks (e.g., tools, devices, applications, software, etc.) |
| 1.2.2 Select from most common tools the most effective for the purposes (defining personal and professional needs, motivations, desires and resources: qualifications, relevant work experiences, SWOT analysis, etc.). |
| 1.2.3 Understand where one’s own digital competence needs to be improved or updated. Become aware of how to seek opportunities for self-development and of how to keep up-to-date with the digital evolution. |

| 1.3 Solving technical problems. |
|---|
| To develop self-efficacy using digital technologies for detecting and solving technical problems. |

| 1.3.1 Be able to detect technical problems that can arise while operating devices and using digital environments (e.g., hardware, operating system, software, applications, etc.). |
| 1.3.2 Be able to find appropriate solutions to solve technical problems (in software or hardware) or alternatives when problems cannot be solved. |
Table 2. Challenge-based model for a practical training intervention from the “basic digital competences” framework for unemployed citizens

| Challenge title and description | Activities | Digital Competences |
|-------------------------------|------------|---------------------|
| **1. Explore yourself!**<br>Identify personal and professional needs, motivations and current digital resources.<br>Short biography with photos, in shared Gdoc or Gslides, inside a shared folder in GDrive. | 1. **Self-knowledge**: Interviews can be prepared with trainees working in pairs to help self-exploration. Work on what each trainee has done so far and their current goal (where they want to be). Interviews can be videoed and then played back.<br>2. **Self-presentation**: Using what has emerged from the interviews, each trainee prepares a first mini-biography. Trainees take photos of themselves (in pairs) that they must upload to the bio document. They can also take another photo or search for another image that helps them to present themselves. The bio must be saved to a GDrive folder created by the trainee.<br>3. **Ego surfing**: Trainees search the Internet to discover their current presence on the web. | CA1: Digital problem solving<br>1.1. Using and configuring the most common digital solution systems<br>1.2. Applying digital solutions to identified needs<br>CA3: Digital information seeking and organising<br>3.1. Seeking digital information<br>3.2. Organising digital information<br>CA4: Digital content creation<br>4.1. Developing digital content<br>CA5: Digital communication and collaboration<br>5.2. Collaborating through digital technologies |
| **2. Guide yourself!**<br>Generate a personal professional plan, using the relevant digital tools and job-seeking strategies.<br>‘SWOT’ or similar personal professional plan. | Trainees explore the Internet in relation to their interests and motivations according to their work expectations. Using the results of their work in the previous challenge, and taking into account personal goals, trainees perform an individual job search on the Internet to find out about professions or occupations that fit in with what they have in mind.<br>1. **Explore**: Trainees explore a variety of job search portals, using filters and different searches to appreciate the range of offers, view the requirements, etc.<br>2. **Initial SWOT**: All the information is collected in a doc file, and an initial SWOT analysis is produced, identifying Opportunities and Threats. The analysis can be completed with information on Weaknesses and Strengths extracted from the previous challenge. Examples of SWOT are provided to help with production of the analysis, which can be done using a simple table in a doc file or other text-processing functionalities (depending on levels). | CA1: Digital problem solving<br>1.1. Using and configuring the most common digital solution systems<br>1.2. Applying digital solutions to identified needs<br>CA3: Digital information seeking and organising<br>3.1. Seeking digital information<br>3.2. Organising digital information |

(Continued)
Table 2. (Continued)

Title of the learning project: “How to search for a job online”

| Challenge title and description | Activities | Digital Competences |
|--------------------------------|------------|---------------------|
| 3. Update yourself!            |            |                     |
| Build a self-presentation package relevant to your professional plan. | Create your professional identity, profile and image. | CA1: Digital problem solving<br>1.1. Using and configuring the most common digital solution systems<br>1.2. Applying digital solutions to identified needs |
| CV, Motivational letter or presentation letter. | 1. Create your CV and motivation letter!<br>It is time to put all the information in order and prepare it for the outside world. Different models and modalities of CV are explained to trainees, as well as examples of letters of motivation and presentation. Trainees can work with any word processor tool and then upload it to Drive, or work in Gdocs. | CA2: Digital citizenship<br>2.1. Developing a digital identity with privacy<br>2.2. Protecting data and digital systems and using digital technologies ethically and responsibly<br>2.3. Engaging in citizenship using digital technologies |
|                                | 2. Peer review: CVs and letters of presentation can be evaluated in pairs: for example, using role play, with one trainee being the employer and the other the job candidate. | CA4: Digital content creation<br>4.1. Developing digital content |
|                                | 3. Send the CV and letter by mail. | CA5: Digital communication and collaboration<br>5.1. Communicating through digital technologies<br>5.2. Collaborating through digital technologies |
| 4. About.me!                   |            |                     |
| Improve your online presence and engage in digital communication with job offers. | Active visualisation | CA2: Digital citizenship<br>2.1. Developing digital identity with privacy<br>2.2. Protecting data and digital systems and using digital technologies ethically and responsibly<br>2.3. Engaging in citizenship using digital technologies |
| LinkedIn full profile, with photo, CV, bio. About.me online bio. Full profile on job search portal. | 1. Create a profile on a job search portal and on a professional social network, such as LinkedIn or about.me. Now trainees are ready to make this information visible on the web by registering on a job search portal, learning how to upload their CV and photo, and how to sign up for offers of work. If time allows, trainees can learn how to set up email notifications for job offers and alerts. | CAS: Digital communication and collaboration<br>5.1. Communicating through digital technologies |
|                                | 2. Apply for a job through a job portal or LinkedIn. | 5.2. Collaborating through digital technologies |
| 5. Network yourself!           |            |                     |
| Interact with employers and communicate with others during your job seeking process. | Engage in digital and face-to-face communication in a network. | CA5: Digital communication and collaboration<br>5.1. Communicating through digital technologies<br>5.2. Collaborating through digital technologies |
| Full self-presentation package. | 1. Let’s network: Trainees start to create their own network (for example, with other classmates) and interact. They search companies that interest them, and get in touch with them and/or former co-workers. |  |
| First contacts with employers. | 2. Elevator pitch: Explain your online job-seeking plan to your classmates. |  |
3.3. Validation of the framework through implementation by end-users

The challenge- and competence-oriented, practical training proposals elaborated by practitioners were implemented in the workshops of the SELFEE project in Barcelona and Amsterdam to expose end-users to the latest version of the framework and integrate their evaluation into a third iteration.

This implementation of the training and evaluation by end-users produced a total of 88 answers from trainers (four trainers, 22 answers each; see Supplemental Material 2).

Disagreements (12) were exclusively related to applicability and not relevance. Of the twelve disagreements, ten were concerned with the applicability of competences within the two nuclear areas, CA1 and CA2: C1.1, C1.2, C1.3, C2.1, C2.2 and C2.3. The remaining two disagreements concerned C3.2 and C5.1. Overall, the trainers evaluated C1.3, C2.3 and C2.2 as the least applicable of the framework’s eleven competences, and C3.1, C4.1 and C5.2 as the most applicable (Figure 3(a)).

In their comments, trainers described Competence 1.3 (Solving technical problems) as too ambitious (Trainer 1), requiring far more time (Trainer 2), not achievable (Trainer 3) or not meaningful enough (Trainer 4) for Applicability. Similar kinds of comments, albeit less critical, described Competence 2.2 (Engaging in citizenship using digital technologies) and Competence 2.3 (Protecting data and digital systems and using digital technologies ethically and responsibly) as narrowly applicable, given the limited time and digital level.

Trainees in the end-users workshop were also most critical of C1.3, which was evaluated as both the least useful and least-often achieved, whereas C3.1 and C1.1 were described as both the most useful and most-often achieved (Figure 3(b); see also Supplemental Material 3). Trainees were also critical of Competence 5.1 (Communicating through digital technologies), a concern they shared with Trainer 2, who disagreed with its applicability, commenting that the “video calls, forums, Google Drive, etc., and even the social media were way beyond their league”.

An analysis of both end-users’ responses was used to define the final version of the framework in this study (Table 3). Competence C1.3 was removed from the framework in view of the negative evaluation received from both trainers and trainees, in terms of relevance and applicability ratings on the one hand, and achievement and usefulness ratings on the other. Competence C5.1 was also criticised by both end-users, and was modified following the recommendation made by several trainers for a more “entry-level adaptation”.

Figure 3. Evaluation of the implemented framework by end-users (3a. Trainers and 3b. Trainees. *Extrapolated from data collected on C3.2 in Amsterdam; see Supplemental Material 3).
Table 3. Final version of the “basic digital competences” framework for unemployed citizens

| Competence area 1: Digital problem-solving |
|-------------------------------------------|
| Identify digital competence needs and appropriate digital solutions, define a professional plan and develop self-efficacy using the most common digital technologies. |

1. Using and configuring the most common digital solution systems
   To know the basics needed for operational usage of the most common digital tools used to interact in the digital world.
   1.1. Understand the basic ICT concepts of hardware, software applications and networks.
   1.1.1. Understand the basic ICT concepts of hardware, software applications and networks.
   1.1.2. Be aware of the most commonly used digital devices and applications and how they can help solve job-search problems.
   1.1.3. Use a digital device and Internet (control the computer with keyboard, mouse or trackpad).
   1.1.4. Configure digital environments according to personal needs (e.g., accessibility, settings, etc.).

2. Applying digital solutions to identified needs
   To understand where one’s own digital competence needs to be improved or updated for employability purposes. To identify needs, select the appropriate digital solution and apply it.
   2.1. Be aware of the possible existence of unknown tools for helping define professional/employment future (e.g., competence map, online questionnaires to define motivations, strengths, skills, etc.), and be able to identify and use the appropriate digital solutions for specific tasks (e.g., tools, devices, applications, software, etc.).
   2.1.2. Select from among common tools the most effective for the purpose (defining personal and professional needs, motivations, desires and resources: qualifications, relevant work experiences, SWOT analysis, etc.).
   2.1.3. Understand where one’s own digital competence needs to be improved or updated. Become aware of how to seek opportunities for self-development and of how to keep up to date with the digital evolution.

| Competence area 2: Digital citizenship |
|---------------------------------------|
| Build a personal and job search-oriented online presence, engage in citizenship, be aware of personal and other data protection principles. |

2. Developing digital identity with privacy
   To develop and protect a personal and job search-oriented digital identity.
   2.1.1. Be aware of the risks and benefits related to the creation of a personal and job-search online presence (e.g., social network profiles, e-portfolio, CV, etc.) and adopt digital identity in line with job-seeking needs (e.g., ego surfing, checking and recalibrating existing Facebook page, creating LinkedIn profile, checking name and photo, email address, etc.).
   2.1.2. Be able to protect one’s own digital identity (e.g., verify privacy policy, use safe websites, passwords and Wi-Fi connections, update software, etc.).

2.2. Engaging in citizenship using digital technologies
   To develop self-efficacy using digital technologies for taking an active part in social interactions.
   2.2.1. Develop autonomy and self-efficacy as an unemployed citizen using digital technologies in everyday life (e.g., administrative procedures, job-seeking activities, building a personal and professional online presence, etc.).
   2.2.2. Demonstrate a civic attitude in different digital contexts. Be aware of netiquette rules. Show tolerance and respect for others’ opinions, using positive communication.

2.3. Protecting data and digital systems and using digital technologies ethically and responsibly
   To protect personal data and digital systems. To be ethical and responsible when publishing content using digital technologies.
   2.3.1. Know how to protect personal data that could be compromised in digital environments (e.g., access rights, rights of cancellation, safe copies, etc.).
   2.3.2. Protect devices and digital systems against external threats (e.g., using antivirus, passwords, etc.).
   2.3.3. Be aware of author rights and different forms of digital content diffusion (e.g., copyright, copyleft, creative commons, licences, etc.), using them ethically and responsibly (e.g., citations, etc.).
### Table 3. (Continued)

**c. Area 3. Sub-competences and indicators.**

| Competence area 3: Digital information seeking and organising |  |
|---------------------------------------------------------------|--|
| **3.1. Seeking digital information** | To search and select critically digital information and content (e.g., texts, pictures, videos, web pages, etc.) relevant to personal and job search needs. |
| 3.1.1. Implement simple search strategies (e.g., planning, sources, search terms, filters, etc.) to find job information via the Internet (e.g., mobilising one’s social network, registering on relevant online platforms, job search portals, etc.) |  |
| 3.1.2. Use simple criteria to select from information found (e.g., comprehension, quality, adequacy, relevance to needs, etc.) |  |
| **3.2. Organising digital information** | To organise, store and retrieve information and content in digital environments. |
| 3.2.1. Adopt a system for storage and retrieval (e.g., folders, connection between devices, use of the cloud, etc.) of information and digital content. |  |
| 3.2.2. Develop a personal learning environment. |  |

**d. Area 4. Sub-competences and indicators.**

| Competence area 4: Digital content creation |  |
|---------------------------------------------|--|
| **4.1. Developing digital content** | Create and edit job search-oriented digital content in different formats using the most appropriate digital technologies. |
| 4.1.1. Use the most commonly used tools (e.g., Word processor, Excel spreadsheet, Image processor, etc.) to create textual, numerical, and/or audiovisual information/content (e.g., CV, presentation letter, bio, LinkedIn, about.me profile, basic digital self-presentation package, etc.) with structure, clarity and cohesion. |  |
| 4.1.2. Edit digital content (e.g., images, sound, videos, etc.). |  |
| 4.1.3. Produce content with a format adapted to and coherent with the objective and intended audience. |  |

**e. Area 5. Sub-competences and indicators.**

(Continued)
Table 3. (Continued)

| Competence area 5: Digital communication and collaboration |
|----------------------------------------------------------|
| Interact in digital environments, present oneself to employers, share content and collaborate with digital technologies. |

5.1. Communicating with digital technologies
To interact properly (in a manner that reinforces and does not undermine self-presentation) using the appropriate digital technologies adapted to specific employment opportunities.

5.1.1. Use the most common communication tools (e.g., email, videocalls, forums, social media) to achieve the desired self-presentation goals and engage in communication with employers.

5.1.2. Apply the appropriate language and basic strategies for communicating using digital media. Adapt the self-presentation package to specific employment opportunities.

5.2. Collaborating with digital technologies
To interact using collaborative virtual environments. To share digital information and content using the most appropriate digital tools and media.

5.2.1. Be aware of different tools used to collaborate using virtual environments (e.g., different instant messaging (online chat) services, video conferencing, collaborative p2p networks, forums, debate, blogs, Wikis, Google Drive, etc.).

5.2.2. Use the most common tools to collaborate in social and professional networks (e.g., messaging, forums, Google Drive, etc.).

5.2.3. Share digital information and content by selecting the most appropriate digital technologies (e.g., forums, store and share, files in the cloud, send attachments, uploading photos, etc.).
4. Discussion

This study developed and tested a practical conceptual framework that can be applied to solve real-world job-seeking problems. It defines an essential set of ten basic digital competences that unemployed citizens can acquire, in a transversal manner, through a challenge-based practical learning programme.

Conclusions on “Q1: What digital competences are essential for unemployed citizens?”

The feedback provided by experts, practitioners and end-users throughout its iterative elaboration produced an overall view of the basic digital competence needs of unemployed, job-seeking citizens. Their feedback also identified the elements that are currently missing from digital literacy frameworks and employability-oriented initiatives, and led to the incorporation of critical conceptual and practical improvements into the framework and its implementation. New features of the Basic Digital Competences for Unemployed Citizens framework include specific solutions to the needs of digitally-excluded, unemployed adult learners, as well as general solutions aimed at facilitating the translation of such a framework into practical training interventions.

Specific features include the reduction of the overall number of competences from twenty-one in the DigComp framework to ten essential basic competences, each of which is formulated with a description and indicators that offer more immediate relevance for unemployed citizens. This specific emphasis on meeting the specific real-world needs of the end-users is complemented by embedding the application of these ten competences within a “digital job-seeking” situational field whereby unemployed citizens can more readily develop self-efficacy using digital technologies.

More general features include the conceptual reorganisation, within this situational field, of the five DigComp-like areas of competences into a metaphoric atomic field of Basic Digital Competences, in which two competence areas (CA1—“Digital problem solving” and CA2—“Digital citizenship”) occupy a nuclear position that illustrates their core, prerequisite nature, around which the remaining three areas (CA3, CA4 and CA5) can unfold. CA1 also includes, for the first time, a prerequisite competence (C1.1) for using and configuring the most common digital technologies (therefore including the fundamentals of familiarity with hardware and software which were found to be missing from existing frameworks).

Trainers and trainees differed significantly in their overall evaluation of the nuclear competence areas, though they converged in their criticism of competence C1.3—“Solving technical problems”, which was subsequently removed from the final version of the framework.

Trainers’ concerns about the ten competences of the framework were mainly focused on the applicability of the competences within the two nuclear areas. Trainees, on the other hand, evaluated more positively the two nuclear areas of basic competences (especially the newly-incorporated competence C1.1; note the divergent pattern in the evaluation of nuclear and non-nuclear competences between trainers and trainees in Figure 3(a and b) respectively).

The trainers’ stance likely depends to a very large extent on the time constraints they most often face in their training interventions (this was also true for the trainers in the specific context of the SELFEE project), leading them to prioritise the application of the three non-nuclear areas of competences they are more accustomed to in their practice experience. In view of the fact that trainees welcomed the two nuclear areas of basic digital competences, we argue that the reticence of trainers and stakeholders should be transcended. These two areas appear to genuinely correspond to a need that should be taken into account to insure the comprehensiveness of any such basic competence frameworks. They are likely to represent a necessary prerequisite to non-nuclear areas for establishing an effective basic framework ready for practical implementation, regardless of the situational field in which they are embedded.
Conclusions on “Q2: How should a practical training intervention be designed to facilitate acquisition of the competences as defined by the novel conceptual framework?”

Although the characteristics of the digital-excluded, job-seeking citizens were already the main factors for defining the novel conceptual framework, it is critical that they remain, as intended learners, at the center of the process when designing a training intervention. Such intervention tends otherwise to lean towards the sequential teaching of the digital competences listed in the framework, in a manner largely irrelevant to their needs. As exemplified in this study, this pitfall can be overcome by adopting a holistic and transversal pedagogical approach revolving around the applicability axis that enables end-users to experience the usefulness of basic digital competences in the job search processes. This can be achieved by designing meaningful learning challenges centered on real-life activities. The challenge-based learning model implemented for solving five real-world employability and digital job-seeking problems allowed for a more efficient distribution of the digital competences of the framework into the designed learning activities. Thanks to its transversal nature, the model of implementation through a competence- and challenge-based, job-seeking oriented learning programme can facilitate successful acquisition of the ten basic digital competences even during a relatively short practical training intervention. It can also allow for the merging in a single training of digital competences with different, yet intertwined sets of competences, such as Social Emotional Learning (SEL) competences, while increasing the impact of the training in both areas and the effectiveness in the job searching process (SELFEE, 2019). For trainers designing interventions based on this model, engaging intended trainees in pilot testing can help make the learning experience more engaging and significant.

5. Main contribution of the research

In addition to creating new theoretical and practical understandings of the digital job-seeking skills citizens need to develop employability, and to producing two main artefacts, namely, the conceptual framework and the training model, the research brings new theoretical knowledge on design principles for generating such practical competence framework. Instead of grounding the research on a predictive approach based on the specification of new hypotheses, the chosen design approach based on iterative cycles of testing and refinement of solutions is shown to be a valid way to incorporate novel praxis that better answers users’ needs. Relying on existing employability-enhancing digital training initiatives in the analysis and design phases helped to focus the collaborative framework development by researchers and practitioners on practical solutions to real-world problems. The iterative implication of practitioners in the improvement of the framework and its validation through implementation by end-users were largely responsible for the introduction of enhanced solutions such as the reduction of the number of the essential digital competences from twenty-one to ten or for the adoption by trainees of the two nuclear areas of basic digital competences. Though it needs to be continuously evaluated and revised, the model is already well suited to helping to bridge the skills gap faced by digitally-excluded, unemployed citizens, who can readily develop self-efficacy using digital technologies for the solution of real-world job-seeking problems. Implementing such a practice on a large scale will largely depend on policy makers’, recruiters’ and trainers’ inclusion of the newly defined Basic Digital Competences for Unemployed Citizens in future interventions.

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