IO1: FLEXICOMP competence framework and

pedagogic approach

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Abstract

This document provides a Competence Framework for developing the FLEXICOMP training course for VET educators (IO2). The Competence Framework gives a description of each competence included in the key competence domains and related knowledge, skills and attitudes examples. It describes in addition the pedagogic and didactic approach of the course in terms of the overall approach, content areas, technologies and support services that will be utilised.

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Statement of Originality

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Document Summary

- This document provides a Competence Framework for developing the FLEXICOMP training course for VET educators (IO2). The Competence Framework gives a description of each competence included in the key competence domains and related knowledge, skills and attitudes examples. It describes in addition the pedagogic and didactic approach of the course in terms of the overall approach, content areas, technologies and support services that will be utilised.

- The competence framework and pedagogic approach were developed through the results of two research activities carried out in the first phase of the project – lifeworld analysis and state of the art review.

- Lifeworld analysis is a phenomenological research method 'that is focused on descriptions of what people experience and how it is that they experience what they experience'. It uses five constructs to capture this lived experience – life-world, temporality, spatiality, embodiment and inter-subjectivity. The main purpose of using lifeworld analysis in FLEXICOMP is to document and understand the digital experiences and needs of VET educators, as well as those of disadvantaged learners. To carry out the analysis, 6 interactive Focus Groups were implemented involving 29 VET educators and 23 individual structured interviews, totalling 52 participants, together with 9 interactive Focus Groups involving 80 learners in total.

- The state of the art review aimed to find examples of good practices of digital competence frameworks and training programmes that can be learned from in order to develop the FLEXICOMP competence framework and training programme. The approach used in the review was based on 'scientific realist review', which looks at how something is supposed to work, with the goal of finding out what strategies work for which people, in what circumstances, and how. It entailed searching databases and other sources to find relevant good practices, then reviewing relevant items using content analysis. Following initial searching, a total of 132 items were longlisted for review. Appraisal of these items on the inclusion criteria of relevance, target group suitability and recency, reduced the longlist to a short list of 73 items for in-depth analysis.

- Drawing together the key findings of the research, the FLEXICOMP competence framework was developed. The framework comprises three competence domains - Core (Generic) Digital Competences, which covers the basic digital competences VET educators would need to apply digital tools successfully in their practice; Enabling Digital Competences, which focuses on supporting VET educators in collaborating with learners in the classroom and facilitating their acquisition and application of digital skills, and FLEXICOMP-specific competences, which focuses on two key aspects that are specific to FLEXICOMP - the need to apply digital tools to support the needs of adult learners in the VET sector, and the need to equip VET educators with the skills needed to work with vulnerable and disadvantaged people in that sector.

- These three domains are associated with eight competence areas. Each competence area covers a set of specific competences, providing 26 competences in total within the framework.

- The pedagogic approach for FLEXICOMP mirrors the competence framework. It combines six elements: an Instructional design using a blended learning methodology that combines self-directed on-line learning with face to face interactive workshops, peer collaboration and learning-by-doing; the FLEXICOMP Foundation course - a core modular on-line course that links to the competence domains in the FLEXICOMP competence framework; a Collaboration space that provides a collaborative learning space for learners and the FLEXICOMP training team; Applied Learning activities involving assignments and action learning workshops; Monitoring and Support services and Assessment and accreditation.

1.   Introduction

1.1   Background and Context

FLEXICOMP is an experimental project that will develop, test and disseminate an innovative approach to training VET educators. It aims to deliver an innovative curriculum, applicable throughout the European VET area, for supporting the acquisition and application of digital competences in teaching and learning; pilot test the curriculum through the FLEXICOMP training programme and, as a result, improve the digital and teaching skills of educators, so that they can in turn work with disadvantaged VET learners to improve their social and digital inclusion.

A useful way of summarising the project's vision, objectives and expected results is to look at it from a 'Theory of Change' perspective. Theory of Change tells the project 'story' – from the 'presenting problem' it addresses through to the change it hopes to make on that problem at the end of the project and beyond (i.e. the project's expected 'impacts').

Connecting the presenting problem and expected impacts are:

- Activities – actions carried out by FLEXICOMP, that lead to…….
- Outputs – things that are produced by these activities, that lead to……
- immediate outcomes - changes in awareness and knowledge, that lead to…….
- intermediate outcomes- changes in behaviour and structures.

Underlying this 'change journey' are 'theories' (assumptions and hypotheses), for example:

- A theory of what is causing the 'presenting problem'
- A theory of what is needed to bring about the desired solution
- Assumptions that if we take Action 'X', this will produce Output 'Y', which will then lead to Outcome 'Z'.

A simplified Theory of Change for FLEXICOMP is presented in the Figure below.
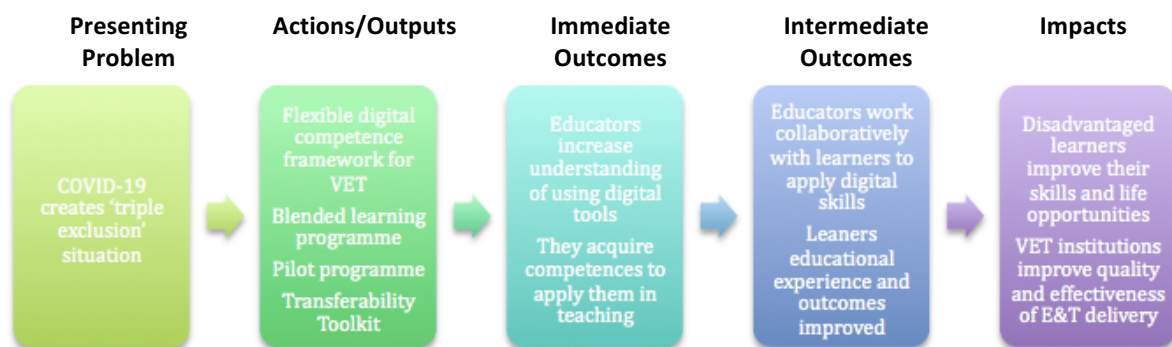
Figure 1: FlexiComp Theory of Change

As Figure 1 shows:

The '*presenting problem'* FLEXICOMP addresses is:

The level of digital competences in the EU VET sector is relatively low. VET educators need to acquire a wider range of skills to help disadvantaged learners – who themselves lack the digital competences they need to improve their life opportunities.

FLEXICOMP's 'theory' about the *causes of this problem* is:

COVID-19 accelerated the transition of many of the aspects of everyday life online, including education. The pandemic exposed the many inadequacies and inequities in our education systems. Moreover, it amplified existing structural inequalities in society. COVID-19 added a further dimension to the existing problem of 'dual exclusion' – the tendency for digital technologies to play play a major

role in *reinforcing* social inequalities. Against this background, VET educators lack the digital and pedagogical competences needed to deliver more flexible, adaptive and resilient solutions to meet future new challenges and realities – particularly the competences needed to work effectively with people who suffer 'dual exclusion', and who need support to transition into a rapidly evolving digital economy.

FLEXICOMP's **solution** to this problem is:

- develop, implement and evaluate an innovative approach to delivering digital competence training for VET educators. Support them to apply their new skills to work with disadvantaged learners, so they in turn acquire new digital skills that can improve their life opportunities.

FLEXICOMP's longer term **expected impacts** are:

- for VET organisations, the integration of good practices and new methods into professional activities; increased workforce capacity and professionalism; improved cooperation with partners from other countries; better targeting of teaching practice that in particular meets the needs of marginalised and disadvantaged learners and improved digital capacity and application of digital tools to deliver quality teaching.

- for disadvantaged learners, improved digital and media competences; improved life opportunities, including increased employability and access to labour market opportunities; improved social and personal development; Increased social and digital inclusion.

- at the macro-level: contributing to building capacity to implement online, blended and distance teaching and learning; promoting networking of institutions across the EU, sharing of resources and expertise; promoting collaboration with digital technology providers and experts in educational technologies and relevant pedagogical practice to stimulate cross-sectoral knowledge sharing; supporting the development of tailor made solutions adapted to local challenges and realities.

FLEXICOMP's **immediate outcomes** are:

- For participating educators - an increased understanding of how digital tools can be applied in teaching practice; an increased understanding of the opportunities afforded by digital tools in delivering quality learning; an increase in the core digital competence areas covered by the programme, aligned to the EU DigCompEdu framework; programme participants acquire additional applied digital competences to deliver innovative learning for disadvantaged and excluded learners.

FLEXICOMP's **intermediate outcomes** – changes in behaviours, situation and organizational structures - are:

- continuing professional development of VET educators; VET educators apply new competences to developing and using innovative teaching practices; improved teaching practice and learning outcomes for learners; increased professional mobility for VET educators.

To achieve these objectives and expected outcomes and impacts, the project methodology and implementation incorporates a range of activities, involving different approaches, methods and tools, including:

- Developing a new digital competence framework and pedagogic approach for VET educators. This involves a review of relevant competence frameworks and training programmes, together with lifeworld analysis that identifies the challenges people who are digitally excluded face.

- Development, piloting and evaluation of an on-line training programme which incorporates micro-learning, podcasting and an interactive game.

- Incorporating the evaluation results into a Transferability Toolkit to support scaling up and out of the programme.

1.2   The contribution of IO1 to FLEXICOMP

Figure 2 shows how the project 'Theory of Change' is implemented.
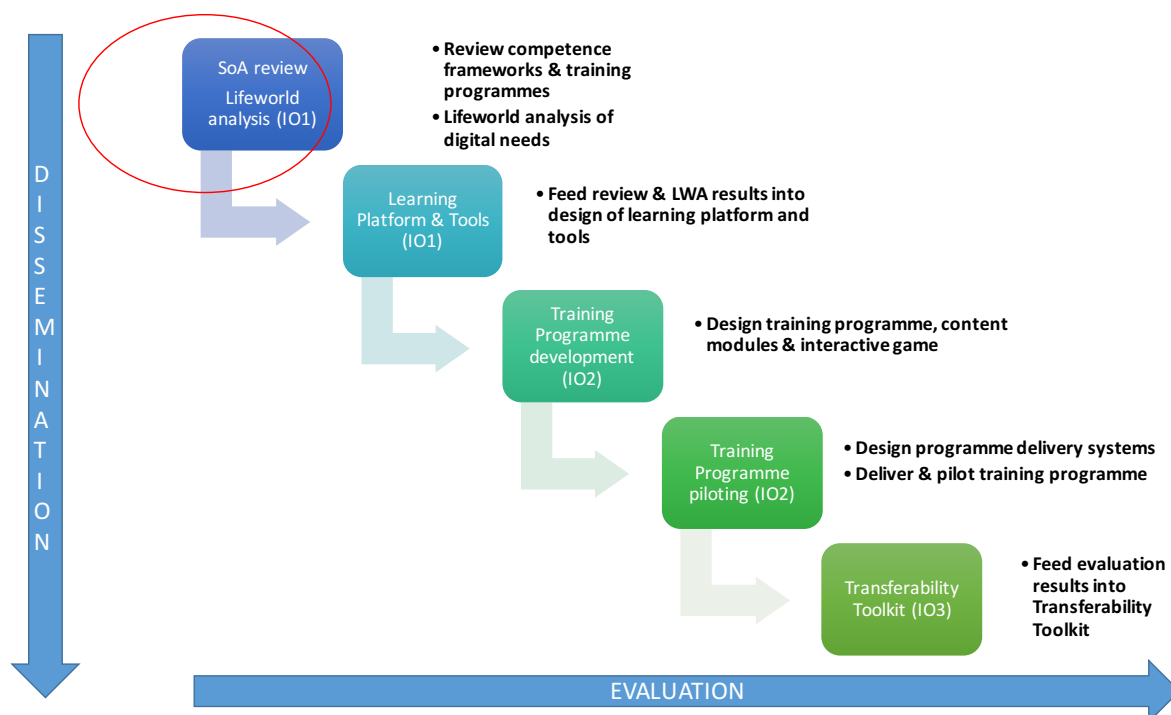
Figure 2: FLEXICOMP Implementation Plan

As Figure 2 shows the implementation plan covers the following key objectives and activities:

- developing a flexible digital competence framework for educators working in the VET (vocational education and training) sector, including competences that enable educators to use digital tools to work with vulnerable groups, so as to in turn improve their digital competences and knowledge

- developing a blended learning programme – using micro-learning and game-based learning - to enable educators to acquire these competences and apply them in practice

- piloting and evaluating the programme with 200 learners in four different VET contexts – school-based vocational training, college and further education training, vocational training for vulnerable young people and continuing vocational training for adult learners

- disseminating the project results to a wide stakeholder constituency including policy-makers, educators, youth organisations and the research community

- developing a strategy and Toolkit for scaling the programme up and out.

Three 'intellectual outputs' are produced through these activities:

- FLEXICOMP Competence framework and pedagogic approach (IO1)

- VET educator Digital Competence Training programme development and piloting (IO2)

- Transferability Toolkit (IO3).

Intellectual Output 1 (IO1) – FLEXICOMP Competence Framework and Pedagogic Approach – provides the competence framework that will be used to develop the VET educator training programme (IO2). It specifies the competence domains covered, the competences that make up these domains and the combinations of knowledge, skills, attitudes and purposes needed to acquire and apply these competences. It also sets out the pedagogic approach and teaching and learning methods used to deliver the training programme. This is the focus of this deliverable.

1.3   Structure and contents of this Deliverable

This Deliverable is set out as follows:

- Following this Introduction, Section 2 presents the methodology used to develop IO1, based on a combination of 'realist review' and 'lifeworld analysis' research

- Section 3 presents the main findings of the research

- Drawing on the research findings, Section 4 presents the FLEXICOMP competence framework

- The concluding section, Section 5, sets out the pedagogic approach for the FLEXICOMP training programme

- Annex I provides a list of the items reviewed in detail in the state of the art review.

2.   Methodology

2.1   Overall approach

The overall approach to producing the FLEXICOMP Competence Framework and pedagogic approach is grounded in baseline research to define the 'landscape' in which the training programme needs to operate. The results of this research are then reviewed and integrated to feed into the production of the competence framework, which is then matched to the pedagogic approach and model to be used in the training programme. This approach combines five steps, as illustrated in Figure 3.

Figure 3: Overall approach

As Figure 3 shows, the overall approach incorporates five tasks:

- Task 1 - Methodology and Toolkit – sets out the research methodology and provides a toolkit to collect and analyse research data

- Task 2 - Lifeworld analysis (LWA) implementation – provides a procedure and tools to implement lifeworld analysis. LWA is an ethnographic methodology that captures the 'lived experience' of FLEXICOMP's target groups – VET educators and VET learners from vulnerable groups. The main objectives of LWA are to understand and capture the barriers and challenges that inhibit the use of digital tools in teaching and learning and to identify the 'critical incidents' that VET educators are likely to experience when working in educational practice with marginalised and vulnerable people

- Task 3 – 'State of the Art' review of digital competence frameworks and training programmes – with a particular focus on digital training for disadvantaged learners. The main objective of the review is to identify and review relevant examples of good practices that can be learned from in order to develop the FLEXICOMP competence framework and training programme

- Task 4 – Competence framework development. This draws on the results of the LWA and state of the art review to develop the FLEXICOMP digital competence framework.

- Task 5 – Pedagogic model development. This draws on the results of the LWA and state of the art review to develop the pedagogic model for the FLEXICOMP training programme, the didactic approach of the course in terms of the overall approach, content areas, technologies and support services that will be utilised.

2.2   Lifeworld Analysis

2.2.1 LWA Overview

Lifeworld analysis is a phenomenological research method 'that is focused on descriptions of what people experience and how it is that they experience what they experience' (Patton, 1990) [1]. It aims to capture 'the world of daily life' (Schutz, 1962) [2] through examples and varieties of people's 'lived experience', especially in the form of anecdotes, narratives, stories and other lived experience accounts that are rooted in everyday life. It aims to understand how home, family, work and street life, peer groups and peer interactivity contribute to the 'shared meanings and understandings that enable us to perform actions that we know others will comprehend' (Habermas, 1984) [3]. Following Habermas, a key objective of lifeworld analysis is also to surface and explore the dynamics through which 'lifeworld' is colonised and controlled by 'system' – in particular by capturing the processes through which the 'communicative practices' of everyday life are subordinated by technology and 'technicisation'. In other words, lifeworld analysis is interested in how technology is used as a tool in power structures and power relations, and how this impacts on social exclusion.

There are five main ways in which lifeworld analysis is applied as a methodology in research. For FLEXICOMP we use methods and techniques drawn from two approaches. First, 'lifeworld analysis' (Ashworth, 2003; Dahlberg et al, 2008) [4] [5] which aims to document and understand the lifeworld of someone and focuses on 'existential ' topics such as the person's sense of self-identity and embodied relationships with others in the environment in which they live. Second, 'relational research' (Finlay and Evans, 2009) [6], which aims to empirically document and understand someone's lived experience and focuses on things like sense of being-in-the-world and the construction of 'coping strategies'.

To capture both 'lifeworld' and 'lived experience', the lifeworld analysis methodology uses a framework comprising five key constructs (Ashworth, 2003; Giorgi, 2003) [7] which are applied to frame the collection and analysis of information collected for a phenomenon of study in a specific location. The five constructs used in the analysis are shown in Table 1.

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1 Patton, M. Q. (1990). Qualitative Evaluation and Research Methods (2nd ed.). Newbury Park, CA: Sage.

2 Schutz, A., 1962. Collected Papers I: The Problem of Social Reality, Maurice Natanson (ed.), The Hague: Martinus Nijhoff.

3 Habermas, J., 1984. The Theory of Communicative action vol. 1: Reason and the Rationalisation of Society. Boston: Beacon Press

4 Ashworth P D (2003) An approach to phenomenological psychology: the contingencies of the lifeworld. Journal of Phenomenological Psychology 34 (6):145– 156.

5 Dahlberg, K, Dahlberg, H and Nystrom, M (2008) (eds) Reflective lifeworld research. 2nd edition. Lund, Sweden: Studentlitteratur.

6 Finlay, L and Evans, K (2009 Forthcoming) Relational centred qualitative research for psychotherapists and counsellors: exploring meanings and experience, Wiley

7 Giorgi, A and Giorgi, B (2003) Phenomenology. In J A Smith (ed.) Qualitative psychology: a practical guide to research methods. London: Sage

Table 1: Lifeworld analysis framework and constructs

Construct	Focus
Life-world	The defining features and characteristics of the lifeworld and how the lifeworld is experienced through everyday life – for example how digital exclusion is experienced when carrying out everyday tasks like shopping or how digital challenges are experienced on an everyday basis in the VET classroom
Temporality	How people experience time, both in terms of their broader historical position (for example how does being in a particular point in the 21st century affect digital exclusion?) and in an everyday sense, for example are there particular times in the day that affect disadvantaged learners' access to digital technologies?
Spatiality	How people make sense of the world through geographical structures and boundaries (for example, how does the way the neighbourhood is constructed shape access to digital technologies? Does the VET classroom environment affect how digital technologies are/could be used?)
Embodiment	Focuses on the body and the physical space in which the body operates. It refers to the actual shape and innate capacities of the human body. It also refers to how people acquire 'embodied skills' by dealing with things and situations - how our relation to the world is transformed as we acquire a skill
Inter-subjectivity	How an individual makes sense of their world and how this sensemaking gets communicated and understood collectively through social interaction. How people and groups interact with 'the system'.

2.2.2 Implementation of Lifeworld Analysis in FLEXICOMP

The main purpose of using lifeworld analysis in FLEXICOMP is to document and understand the digital experiences and needs of VET educators, as well as those of disadvantaged learners. It aims to capture people's lived experience of engaging with the digital world in teaching practice and in everyday life. This is intended to highlight the key barriers to acquiring digital competences as well as key learning needs by capturing the narratives of people's 'lived experience' of the digital world. It further contributes to key FLEXICOMP objectives by:

- supporting the project's overall 'design thinking' approach, through gaining an 'empathetic' understanding of the presenting problem - digital exclusion

- supporting the key project objective of 'co-design' – the use of lifeworld analysis ensures the lived experience of users is represented in the development of the FLEXICOMP training programme.

A 'light touch' approach to lifeworld analysis was applied in FLEXICOMP. The core tools in this approach are:

- Structured co-design workshops with disadvantaged learners and VET educators, involving a minimum of one workshop with between 5 and 10 VET educators and a minimum of one workshop with between 5 and 10 VET learners, in Italy, Spain, Sweden and the UK

- Structured in-depth interviews with disadvantaged learners and VET educators.

To deliver the LWA, a set of Guidelines and Toolkit was produced to support the partner research teams. This included the following:

- Structured co-creation workshop Guideline. This provided procedures and tools for working collaboratively with the two FLEXICOMP target groups, including a 'Persona Tool' to clarify thinking about the training programme users and their needs and a Google 'Jamboard' to engage the target groups in developing the FLEXICOMP competence framework and pedagogic approach in more detail. The Guideline also included instructions and tools for compliance with General Data Protection Regulation (GDPR) regulations and for obtaining participants' informed consent. The workshop procedures and tools were designed to be delivered either face-to-face or online, depending on the 'COVID-19' situation.

- Structured Interview Guideline. This provided procedures and tools for collecting data for the LWA in situations in which people found it difficult to participate in a group interview even if organised on-line. The instrument used for data collection was a semi-structured interview schedule. This allows scope for the interviewer to shape the questions according to the profile, experience and background of the interviewee and to tailor the question content to the interviewee's responses as the interview progresses. The Guideline also included instructions and tools for compliance with General Data Protection Regulation (GDPR) regulations and for obtaining participants' informed consent.

- Guidelines and tools for analysis and reporting. These supported the interpretation and assessment of workshop and interview transcripts using a 'phenomenological' content analysis procedure, the aim of which is to extract key messages from the data through a process of 'reduction' (Giorgi, 2003; Patton, 1990).

2.3   State of the Art Review

2.3.1 Purposes and approach

The main objective of the review was to find examples of good practices of digital competence frameworks and training programmes that can be learned from in order to develop the FLEXICOMP competence framework and training programme. The review aimed to ensure we design a training programme that works, as well as adding further to our understanding of what are the critical incidents and challenges VET educators are likely to encounter working with disadvantaged learners in the classroom. The approach used in the review was based on 'scientific realist review' (Pawson et. al., 2005) [8]. Realist review looks at how something is supposed to work, with the goal of finding out what strategies work for which people, in what circumstances, and how. It maps the direction and nature of travel along which a policy, approach or intervention proceeds, with a particular focus on how 'context' influences that change, and how 'intangibles', like ideological positions and power relations, affect that journey. A key element of the realist review approach is a search for, and an assessment of, the 'middle-range theories' that underpin interventions. These lie somewhere between the 'grand theories' that seek to explain all social structures, interactions and behaviours within a unified theory, and the detailed minutiae of social relations that are too particular to be generalizable. As Pawson puts it, doing a realist review entails "feeling your way" through the available literature to find out how to do something that may involve many different ways, depending on the complex and changing social systems that surround a particular question. The review starts with identification and clarification of the research purposes, focusing on the key questions the research needs to address. Subsequent stages of the review entail an iterative process of:

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[8] PAWSON R, GREENHALGH T, HARVEY G, WALSHE K. (2005), REALIST REVIEW--A NEW METHOD OF SYSTEMATIC REVIEW DESIGNED FOR COMPLEX POLICY INTERVENTIONS. J HEALTH SERV RES POLICY. 2005 JUL;10 SUPPL 1:21-34.

- mapping the key 'theoretical drivers' that shape policy and practice

- searching the field for 'evidence', including 'grey' literature

- applying quality criteria to the material identified, based on relevance and rigour

- extracting data from the final shortlist of material to uncover evidence in support or contradiction of the theoretical drivers identified

- synthesising the results of the data extraction and analysis to re-assess the original 'map' of the field, and to produce conclusions and recommendations on 'what works, for whom under what circumstances'.

2.3.2 Implementing realist review in FLEXICOMP

The review aimed to review the landscape of digital competences in Europe as a whole, but with particular attention to the situation in the countries represented by the partnership, i.e. Germany, Italy, Spain, Sweden and the UK. This required:

- A focused review of the overall state of the art and theoretical literature in the field of digital competences, with a particular focus on the VET sector
- A review of good practices at the EU level
- An assessment of digital competences and training programmes in the five partner countries.

This research involved desk research - collecting 'secondary' information – e.g. from reports and databases in the field of digital competences and digital competence training programmes – and covered covers two activities:

- State of the art Review and Good practices review
- Documentation analysis.

State of the art Review and Good practices review

The aim of the state of the art review was to provide a picture of the state of the art in digital competences and digital competence training at i) EU level and ii) national level. The focus was on collecting and analyzing example of ***practical*** interventions aimed at developing digital competence frameworks and training programmes. However, it also covered collecting information on theory and policy that could be useful for developing the FLEXICOMP competence framework and training programme

The ***sources of information*** for the review covered the following:

- Theories of digital competences – for example an article in an academic journal
- Policies at national and EU level that support digital competences
- Reports and Guidelines on how to deliver training programmes to support digital competence acquisition
- databases of EU funding programmes like H2020 and Erasmus+
- national databases that cover digital competences; specialist websites.

Although information on digital competences in general was within the scope of the review, the emphasis was on competence development in the VET sector.

The ***methodolog***y for the state of the desk research entailed five steps:

- Step 1 – Define search terms for the review

- Step 2 – Choosing relevant databases/search engines, and initial searching

- Step 3 – Extended search

- Step 4 – Data appraisal

- Step 5 – Final list of relevant items.

Step 1 – Define search terms for review

This required a list of search terms (keywords) to be defined that were then applied to identify relevant items of potential interest using different search engines and databases.

Step 2: Choosing information sources and doing initial search

This step involved choosing the information sources (databases) likely to produce the best research results and then interrogating these databases using the search terms decided on in Step 1. The search engines included

- Google
- Google Scholar
- Microsoft Academic
- BASE: Bielefeld Academic Search Engine
- Directory of Open Access Journals
- OpenAIRE
- Scopus
- Web of Science.

Step 3: Extended search

This step aimed to narrow down the field of items of information derived from Step 2 to produce a **long list** of items by comparing the returns of the different information sources searched against each other for consistency and overlap.

Step 4: Data appraisal

This Step involved checking the list of items returned in Step 3 to eliminate items that were not relevant. This was done by scanning abstracts, summaries or conclusions that were available for the item. Items were eliminated that did not conform to the following 'inclusion' criteria:

- Relevance - does the item provide information on digital competence frameworks and digital competence training programmes?
- Target group suitability - does the item provide information on how to develop digital competence frameworks and training programmes for VET educators and disadvantaged learners?
- Recency – was the item produced in the last five years and, if not, is the item still relevant now?

Step 5: Final list of relevant items

The items retained following the preliminary data appraisal carried out in Step 4 were then collated so they could subsequently be analysed. This was done using a spreadsheet containing the shortlisted items. Each item was described in the spreadsheet using a list of key descriptors, i.e.:

- Name of the item
- Source (e.g.database name)
- Abstract - a short summary of the item
- Date item produced.

Documentation analysis

This activity collected and reviewed available documentation to obtain more detailed information on the final set of good practices derived from the review.

This documentation included:

- The full text of an academic journal article covering a theory, or other articles/comments on that article

- The full text of a major policy, or articles/comments on that policy

- On-line material from a good practice case's website

- On-line material on a case from other websites – for example EU funded programme databases like Erasmus+ or H2020

- Articles and papers about the case – typically found in academic journals

- Official documentation on the case– for example 'Annual Reports', Evaluation Reports commissioned by funders of the case.

The documentation analysis took the following steps:

- Step 1: Familiarisation with the 'Desk Research Template'. The Template was produced to document all the information collected and reviewed about a state of the art item and a good practice case

- Step 2: Review the information obtained about the state of the art item/good practice case collected through the desk research. Enter any relevant information into the 'Desk Research Template'.

- Step 3: Review any available documents collected – journal articles, reports on a good practice case etc. Enter any relevant information into the 'Desk Research Template'.

- Step 4: If a good practice case has its own dedicated website, visit the website to extract any relevant information that can be entered into the 'Desk Research Template'.

- Step 5: Visit any websites identified that contain information on the case. Search these websites for relevant information on the case. Extract any relevant information that can be entered into the 'Desk Research Template'.

- Step 6: Consolidation and integration of the information in the 'Desk Research Template'. Review the information entered into the template. Combine together 'duplicate' information. Discard any information that is not relevant. Note any information gaps in the template. If necessary, carry out a Key Informant Interview with someone who knows the case well to fill in the information gaps.

3. Key findings from the research

3.1 Key findings from the Lifeworld Analysis

As noted above in Section 2, the LWA involved two groups: one group of VET educators and one group of VET learners. Data were collected for these groups in Italy, Spain, Sweden and the UK as follows:

- For VET educators, 6 interactive Focus Groups involving 29 educators and 23 individual structured interviews, totalling 52 participants

- For VET learners, 9 interactive Focus Groups involving 80 learners in total.

The key characteristics of participating VET educators are as follows:

- The majority of participants – 57% - were in the 36-50 age group. 31% were in the 51-65 age group and 12% in the under 35 age group. No significant differences in age were identified across the participating countries.

- Slightly more females – 53% - were represented than males. The representation of females was much higher in Italy.

- In terms of experience of teaching in the VET sector, the participating population show a spread across the spectrum, from less than 1 year to over 30 years teaching experience. However, most participants were very experienced VET educators. This is reflected by the mean number of years teaching experience of the participating group – at 16.3 years. No significant differences in length of VET teaching experience were identified across the participating countries.

- Most participating VET educators reported a high level of digital competences. When asked to rate their level of digital competences on a scale of 1 to 5 (1= no or very low competence level; 5=very high level) none of the participants rated themselves as having no or very low levels; 12% rated themselves low; 26% rated themselves moderate; 41% high and 21% very high. No significant differences in level of digital competences were identified across the participating countries.

The key characteristics of participating VET learners are as follows:

- In contrast to the VET educators, who reflect a spectrum of age ranges, all of the participating VET learners were in the 16 – 25 age group.

- Females were under-represented, at 27%, with males constituting 73% of participants.

- A quarter of participants identified as belonging to a minority ethnic group.

- A large majority – 71% - of participating VET learners reported a moderate level of digital competences. 22% rated themselves moderate and 7% rated themselves as high.

The results of the analysis of these data are presented below in turn for each group.

3.1.1 Lifeworld Analysis key findings: VET Educators

Training Needs

- The majority of VET educators who took part in the LWA define themselves as moderate to high level digitally competent. However, there was a suggestion from participants that a minority of their colleagues are less than digitally competent. It was suggested these can be categorised into two groups – those who are technology-averse and are reluctant to use digital tools in their practice, and those who don't have the time or interest.

- The LWA highlighted a range of digital tools routinely used in teaching – including LMS, tools

for collaborative work, and social media and video channels for communication. Although it was acknowledged that VET educators could benefit from training in the use of digital tools that are less commonly used in the classroom – for example 'Google Drive' - the main focus from the LWA in terms of training needs was on pedagogic rather than 'technical' aspects. In other words VET educators expressed a need for training to help them understand which combinations of tools would be most effective in particular instructional situations – what tools for which purposes

- A number of these 'techno-pedagogic' needs were highlighted by the LWA, including: GDPR, ethics and moral issues associated with using digital technologies; understanding how students themselves consider and engage with digital tools; a how to adapt classrooms to improve learning outcomes for students with disabilities, including learning challenges; how to capture the 'user experience' from the student point of view; which tools to use for assessment and the potential challenges around digital examinations, linked to a broader need for training to increase understandings around digital security and academic integrity.

Challenges

The key challenges for VET educators in using digital tools in the classroom highlighted by the LWA were:

- Learners who don't have a computer at home, or an internet connection, or access to the right software.

- Learners with poor digital skills and who don't know what is possible on the internet

- Lack of motivation of learners to use digital skills for learning rather than social media/gaming etc., and helping motivate them to see that they really need these skills to access services, get work etc. - not just use for social situations (e.g. instagram and tiktok)

- Access to the right hardware in education settings to teach

- Varying skill levels within the same class making it hard to teach all; and in terms of outcomes, hard to get everyone to reach at least a necessary baseline. It's much harder to assess different abilities/challenges of students in online context; and to monitor group activities

- The skills learners need varies by device, e.g. android v apple smartphone v computer; and when using an app they've learnt to use in the classroom on a different/older device, the functionality may change, making it difficult to adapt outside the classroom.

- Educator digital competence: technology is not fully integrated into the way teachers have learnt to teach others - these skills need improving; awareness of and ability to use various digital tools; training of educators and institutional use of digital tools need to improve.

- Use of technology is increasing inequality: those who have even basic skills can improve thanks to technology, those who have poor skills just see their situation worsen because digital skills are now necessary even for job search.

- Teaching and learning online is different from doing it face-to-face – teaching methods must be adapted, especially with respect to engagement/attention. Online courses and physical courses use tools in different ways

- Real time contact in the classroom gives non-verbal feedback that shows when learners are having problems, and this is missing in digital classrooms.

- Requests from students for help/additional information are sometimes excessive

- The standard of tools that are provided for teaching is sometimes disappointing (e.g. created

quickly/don't work on mobiles).

Lifeworld – how the digital is experienced through everyday life

The key messages from the LWA were:

- No access to computer/device or internet connection at home can mean students can't consolidate/embed learning outside the classroom

- Learners are made responsible for their own access to and use of devices; this leads to a very high number of requests for help with is very stressful to manage/respond to

- Learners not paying attention: they receive online training passively, they keep their webcams turned off, they don't intervene in discussions

- With learners with basic skills, it is necessary to use basic technology: use all videoconferencing apps, and lots of smartphone apps, teach them how to make the most of their smartphones, how to download apps such as Zoom, etc. for doing online job interviews

- Educator workload is routinely a problem: in a teachers' life - educators finding the time to devote to improving digital competence; employers need to give the time for this training.

- The everyday digital worlds of the 'digital natives' and 'non-natives' are oppositional – this polarisation needs to be resolved through collaboration

- Some educators are intimidated by technology – they feel they are judged on technical ability, not their knowledge of their subject. This negatively impacts good teaching and creativity.

- For some educators, digital tools are removed from their everyday practice. They need individualised training on what tools are out there, and how to use them

- Lack of IT support is a daily fact of professional life.

Temporality – how time shapes digital life

The key messages from the LWA were:

- Internet connectivity - slow internet and connection problems may cause delays in the classroom. You always need a plan B in case of bad connection.

- The learning process is slower with online teaching.

- The time needed for lesson planning is much longer in the case of online training.

- Work hours vs Private: online working processes can make it difficult to differentiate between work and non-work hours, sticking to boundaries.

- Training: no time during working day to get the necessary training "Mastery takes time I don't have. ... I just don't have time to stay up to date, to research the newest stuff.". But once training has been done, the ability to use technology saves time.

- New systems: some time-consuming new ways of doing things have been set up, not allowing some the time to really master them. And don't know who internally to ask for support - so continue with basic usage.

Spatiality – how geographical structures shape digital life

The key messages from the LWA were:

- There can be considerable additional complexity just in setting up hardware in a classroom environment: "it took me the whole term to find out how to do things in a more effective way. It can be an issue with the amount of laptops when needed for students. Charging them in

rooms is difficult. There is a charging bank to return them to each day. It's a big place, with limited laptops, so not enough to go round. No time, no training, in a system that seems unnecessarily complex, and no one seems to really understand how to use it effectively."

- Life-work balance – educator perceptions vary. For some, it doesn't matter - "work follows the laptop". For others, it's important to work at work, keeping the boundary between work and home, and that face-to-face enables much more effective interaction and oversight of learning process

- Blended classes (when half of the class are online and half are in the classroom) are very difficult: "Even one person in the classroom when I'm teaching online brings about confusion, distraction."

- For educators, digital space can be lonely, with no coffee room for breaks, chats and support from colleagues. Possibly also true for learners.

- Difficulty knowing how best to communicate in digital spaces to ensure comprehension: "The written word is so liable for misinterpretation. I try to use more films, more Zoom chats. But when they come out to working life, they need to know how to write, so we can't just use Youtube."

- The digital classroom is becoming very informal (for some) for both educators and learners: "I talk to students who are lying on sofa, on the bed, in pyjamas. Where is the limit? What is expected at a university? Would you show up to a real-time seminar in your pyjamas?"

- Setting up break out rooms is much easier in the virtual world – it takes time in real life.

Embodiment - the physical aspects of the digital world and how our relation to the world is transformed as we acquire a skill

The key messages from the LWA were:

- Lack of time/huge workload leads to stress. This stress is embodied in physical and mental health issues

- Asynchronous activities give room for more reflection

- Full human engagement / awareness of body language / group interaction is not possible in virtual meetings: "I feel somehow disabled in an online situation compared to a physical. The ability to see faces is one example. I like to see whom I talk to"

- The 'You-Tubeification' of learning: "We are seeing, more and more, the You-Tubeification of learning. We become less able to take in other forms of information. It's all Google and short films. How does this lead to problem solving and deep understanding? Some things take much harder work. How do we get there?"

- There are some clear physical issues associated with on-line work. The physical set-up at home is not ergonomically appropriate, leading to physical problems; hours of online working lead to eye-strain; blue-light exposure leads to fatigue

- Disability is a major issue in online learning. Some educators cited challenges students who present with disabilities face – including students with visual impairment and cognitive disabilities. Another issue cited was the lack of awareness non-disabled students show in terms of how assistive technologies work.

Inter-subjectivity - how 'the system' and professional and social interactions work in digital life

The key messages from the LWA were:

- Educators experience no input into how digital tools are being used (e.g. zoom). Rules, policies and infrastructure sets the prerequisites for pedagogy - not the other way around.

- The variation in digital competences impacts collegial relationships - those with digital skills are overly tasked with supporting other staff who need support; colleagues differ in their views regarding whether they are happy to teach online or want to teach face to face

- Training of teachers in digital skills depends upon their desire to do it - it's mainly voluntary:

- No unity of approach - top-down systems across the institution can make it very confusing for students, as different systems/programmes in different courses

- The shift to more online learning has been associated with a regression in students' social skills: "The cumulative impact of social isolation and more distance courses has affected students' well-being. How students ability to interact with each other and us has changed. Many more students have challenges."

- Interaction through a screen is so easy to misinterpret – this has the effect of complicating relationships.

The key competences VET educators need to have to train disadvantaged VET learners in digital skills

The key messages from the LWA were:

Basic technical competences

- Microsoft suite

- Film formats and legal issues regarding using google docs

- Communication apps: zoom; email; skype; MS Teamsl; GoogleMeets; virtual meeting basics (e.g. share screen)

- Moodle-type platforms / Educamos

- Web search literacy

- Accessibility of materials, and GDPR issues

- Document storage/management

- LMS (and how to learn and use it in a smart way)

- How best to communicate with students outside classes

- Know about and choose correct tools for the task

- How tools relate to each, and how they can be combined - e.g. Google Meet with a video/audio resource, e.g. a YouTube video

- Standard UX and functionalities

- Basics of human interaction

- Basics of web tech and design

- Hardware: Connectivity, cable formats, extra displays / duplicate screens / extend screens; change the settings of peripheral devices

- Skills to promote group work, including good collaborative online platform (GDPR compliant)

- Excel, particularly how to use formulas

- New forms of presentation, beyond powerpoint

- How to record lessons, archive them for later use, access to reference material, privacy issues around this both with respect to student privacy and copyright

- Help to find good training resources, e.g. a short films/tutorials bank,

- Accessing confidential student information

- Safeguarding

- GDPR

- Confidence and ability to teach yourself new skills

- Design and produce short films

- Awareness of how using a smartphone/android/apple may affect function of tech they are using

Advanced technical skills

- Help choosing between the different tools available, and learning to use them pedagogically

- Create classrooms in MS Teams or Google Classroom

- Knowing how to solve/troubleshoot hardware problems

- Ability to adjust and relearn as tech changes

- Mentors helping with advanced usage

- Tools to create content without relying on intuitive digital tools. e.g., get to know Exelearning to create open educational resources. Being able to use a Sites to share resources, a web, make a good design of the course in Moodle with activities and integrated rubrics and not just upload pdf.

- In remote education, having tools to dynamize a virtual classroom and not only provide one way information

- use of rooms, use of integrated applications to promote student interaction (for example, Mentimeter, Nearpod, Canva, ...), use of remote collaborative tools such as Mural or Miro

- Video editing, use of YouTube channels.

- Arduino programming.

- Creation of webpages.

- Understand what can be shared online.

- Engage learners by encouraging them to share their work with the others.

- Use online collaborative tools.

- Smarter ways of teaching such as multimedia, photos

- All the tools that can be used for teaching, e.g., games, all those tools that use virtual reality.

- How to use games as teaching tool, especially with younger learners.

- Tools for doing interactive activities: interactive games, videos or even films to watch

- How to combine digital technology and learning styles

Non-technical skills

- New relational and social aspects of virtual environments

- Listen out for special needs.

- Divide time between one person teaching, and interactivity

- ability to communicate clearly - especially necessary on digital platforms where body language is not so visible

- ability to know how to vary communication for different audiences

- active listening/receive communication in digital format

- Empathy, patience, problem solving, conflict resolution, adaptation, teamwork, motivational strategies, ability to engage

- Overall pedagogical structure

- Accessibility perspectives

- Lesson planning

- How to build clarity into course design etc.

- Competence to know when to not use digital tools

- How to best operate in a hybrid classroom (some students in person; some online)

- How to practice collaborative instruction and course design in online teaching

- Work back from the teaching goals/intended student achievements, and design activities from there.

Pedagogic design of the FLEXICOMP training course

The key messages from the LWA were:

Content areas

- Be guided by the DigCompEdu framework. Start with all the hardware and software basics.

- The design has to allow for both educators with very basic digital skills, and those who are more advanced

- Combine theory and practice regarding digital skills/competence

- Focus on the systems the educators' institution is using

- Modules of various topics: basic LMS; basic grading and feedback; quiz, exams etc.; how to build online classroom; Microsoft suite, hyperlinks, embedding videos

- Accessiblity training: understanding neurodiversity, and how to find/use appropriate accessibility tools

- How to cope with students with varying digital abilities

- How the pedagogical outcome can drive the choice of tool

- How to do lesson planning/advance preparations for distance programmes

- How to teach writing skills, as these are also important in digital environment

- How to examine progress in digital competence in student group in a digital environment

- Training on gamification, cooperative work, active methodologies

- Training in self-training / individual learning online.

How the course should be delivered

- Design a 'values' based course that is modelled around the VET/pedagogic values that need to be taught

- Deliver the course as a social platform with some facilitation, e.g. with a platform like Spatial.chat – so the course can be experienced as an event in a room, not only as a screen, with a facilitator that guides the actual socializing tool.

- The course needs to be designed to fit the time and resources that educators have available – it should be 'light touch', entertaining and not compulsory

- Dynamic course delivery involving achieving different levels, e.g. through game-based learning, and simulations where a participant plays the educator and the others play the learners

- Multi-media delivery - video, read, listen, act - adapted to different learning styles - video tutorials / online material/modules to browse on-demand / but with a structure: beginning and an end

- Training must be clearly practical, with concrete, practical examples; 80% practice, 20% theory. Include case studies and learning by doing

- Consider delivery as a flipped classroom - asynchronous material, then discussion/workshops/support

- Incorporate peer learning/collaboration; group networking and social support

- Incorporate real time meeting opportunities

- Provide just in time content, relating to where educators are in the academic year, reflecting what they'll need when

- Provide mentoring

- Assessment should combine assessment on activities, as well as written exam and self assessments, together with formative assessment - course evaluation, and continual development based on feedback. The assessment should incorporate verification of the acquisition of competences through practices

Participant support

- Mentoring, to provide individualised support

- Organisational/Employer's support and promotion, enabling time to learn for the educator

- Accessible on-demand support - from compassionate/patient trainer who is available and qualified

- Facilitator/moderator

- Peer-peer feedback/learning

- Forum for Q&A/peer discussion with informed moderator

- Technical support

- Financial support to purchase necessary hardware

- Adaptation of course material taking variety of hardware being used into account

- Links to supplementary information.

3.1.2 Lifeworld Analysis key findings: VET Learners

Training Needs

The key digital training needs for learners identified by the LWA were:

- Help to understand which tools can be used for which purposes
- Instruction on using basic tools like spreadsheets
- Training programmes that are relevant to people's lives
- Programmes that are practical and will help in getting employment.

Challenges

The key challenges for VET learners highlighted by the LWA were:

- Lack of awareness of digital skills training programmes that are available: "You don't know what you don't know - what programmes are out there that could be useful".
- Perception of the dangers and threats of digital technologies, including Hacking, Cyberbullying, Social media/mobile/gaming addiction, scams, fake news
- Lack of support in learning programmes
- The amount of time needed to learn new digital skills
- Fear of failure – the potential shame of not being able to use digital tools.

Lifeworld – how the digital is experienced through everyday life

The key messages from the LWA were:

- It's hard to keep up with fast-changing technology

- Technology intrudes into all forms of daily life- everything we do appears to be mediated through technology, e.g. banking, learning, socialising, studying, employment, information seeking, buying things – it's crucial to acquire the skills to handle this

- The financial costs of accessing systems and tools is a problem for many people

- Technology is a threat to future jobs – people will be replaced with machines

- There is a problem of information overload.

Temporality – how time shapes digital life

The key messages from the LWA were:

- VET training is normally delivered over only 2 years, and can feel hurried
- Digital time is paradoxical – technologies can create efficiencies but we now spend too much time looking at screens

Spatiality – how geographical structures shape digital life

The key messages from the LWA were:

- Equipment availability and connectivity are vital to the learner experience to facilitate the use of digital tools and skills
- Differences between mobile and PC functionality can cause problems for learners.

Embodiment - the physical aspects of the digital world and how our relation to the world is

transformed as we acquire a skill

The key messages from the LWA were:

- Some users experienced physical issues with technology use – for example eye problems and headaches
- Those with motor issues or visual impairments may have difficulty accessing digital tools
- Some apps make the learning process more enjoyable
- Use of mobiles can disrupt your attention from learning (e.g. continual notifications).

Inter-subjectivity - how 'the system' and professional and social interactions work in digital life

The key messages from the LWA were:

- ICTs are an important resource, both in training and in daily life

- ICTs making teaching more dynamic, visual and interactive

- Varying basic skills means that some are confident to search for information/apps, and learn/google how to use them, while others are not.

Competences

The key competences that disadvantaged VET learners need to be trained in are:

Basic technical competences

- Word, PowerPoint, Excel, Drive, platforms to communicate like Teams/Zoom, platform to make presentations
- WhatsApp, Instagram, pdf
- How to use Google
- Google docs/apps
- How to know if information is reliable or is a hoax
- How organize digital information for a school task.

Advanced technical competences

- Creating a blog or channel, positioning it properly, using tutorials
- Virtual Classroom
- Coding and programming
- Design and visualization competences
- Financial apps.

Non-technical skills

- Teamwork both in big and small teams

- Respect, being smart and responsible

- Awareness of teaching those with disabilities, or those with other first languages

- Public speaking

- Tailoring tools to different audiences.

3.2 Key findings from the State of the Art review

As noted above in Section 2, the aim of the state of the art review was to provide a picture of the state of the art in digital competences and digital competence training at i) EU/international level and ii) national level. The focus was on collecting and analyzing example of *practical* interventions aimed at developing digital competence frameworks and training programmes. However, it also covered collecting information on theory and policy that could be useful for developing the FLEXICOMP competence framework and training programme. Following initial searching, a total of 132 items were longlisted for review. Appraisal of these items on the inclusion criteria of relevance, target group suitability and recency, reduced the longlist to a short list of 73 items. These were subsequently reviewed in detail using content analysis. Table 2 shows the items reviewed in detail by item type.

Table 2: Items reviewed in detail in state of the art review by type

Type	N. items
Journal Articles	11
Policies & Reports	11
Projects	20
Studies	20
Other	11
Total	**73**

As the Table shows a broad spread of item types were covered by the review. The two largest categories were 'Studies' – covering examples of research on digital technologies in the VET sectors and 'Projects' – covering good practice examples of initiatives implemented to deliver training for VET educators and learning to improve digital competences. The reviewed items included literature and projects at EU level, and in English language. These were supplemented by review of items in the languages represented by the partnership, as shown in Table 3.

Table 3: Items reviewed in detail in state of the art review by language

Language	N. Items
German	5
Italian	5
Spanish	21
Swedish	11
English/ International	31
Total	**73**

A full list of the items reviewed is provided in Annex I.

Content analysis of the reviewed items covered the following key thematic constructs:

- Utilisation - the use of digital tools in VET teaching and learning
- Challenges – the issues and challenges VET educators face in using digital tools for teaching and learning
- Educator needs - the digital needs of VET educators
- Learner Needs - the digital needs of disadvantaged learners

- Framework structure - how digital competence frameworks should be structured, with a particular focus on the VET sector
- Training Content - what content areas need to be included in digital competence training programmes in the VET sector
- Disadvantaged learners – the Issues and challenges that need to be addressed in working with disadvantaged learners and the 'hard to teach'
- Pedagogy - which pedagogic methods are likely to work best in delivering digital skills training in the VET sector
- Support - which support services are likely to be needed in delivering digital skills training to VET educators, and which support services are likely to be needed in delivering digital skills training to disadvantaged learners.

The results of the analysis are provided below for each of these key themes.

3.2.1   Utilisation

Key messages from the review on the use of digital tools in VET teaching and learning are:

- There is no convincing evidence that the VET sector is lagging behind other education and training sectors in the use of digital tools for teaching and learning
- In general VET educators have a positive attitude towards using digital tools for teaching and learning and would welcome opportunities to acquire additional competences to enable them to advance the use of digital tools in their practice, including experimenting with new tools
- Current use of digital tools in VET teaching and learning is focusing mainly on tools that support 'traditional' pedagogic practices – for example learner engagement, class discussions, group work and collaboration. However, some VET educators are now working with tools – for example gaming technologies – that support more disruptive and 'individualised' practices
- Similarly, digital devices used to support VET teaching and learning primarily focus on 'mainstream' technologies – such as laptops, smartphones and tablets. Devices such as consoles and digital cameras appear to be less widely used.

The evidence base on levels of digital competences in the VET sector is contradictory (Rego and Rial, 2017; Sarceda and Rodicio, 2018; Cózar et al., 2019; Rodríguez et al., 2019). On the one hand, studies reveal that VET teachers perceive their competence as medium-low (Chang, 2017). Other studies report digital competences are at high (Pelegrín, 2016) or medium levels (Falcó, 2017), although higher in personal domains (information search, use of more common tools) than for didactic exploitation (Falcó, 2017). Cattaneo et.a.l. (2020) in a study on how digitalised vocational teachers are concluded that levels of digital competence in the VET sector are comparable to other sectors (although the study is based on the Swiss case only). The study found that the most highly developed digital competence area was ability to select digital resources and the weakest was using digital tools for assessment. Key factors influencing successful acquisition of digital competences were attitudes towards technology, existing frequency of digital tool use and the extent to which workloads left opportunities for development of digital competences. Spanish studies support these findings, with one study concluding that digital teaching competence is "higher in teachers who believe in the usefulness of technologies in the educational world and who also have a positive attitude and a real conviction of their usefulness to improve the teaching-learning process".

A German study on the state of digital learning across all education sectors (Digital Education Monitor, 2017) concluded that directors, teachers and students are generally prepared to deal with the topic of digital media and believe that digitalization will change education. Other studies support this view that the attitude of VET teachers towards ICT is positive, as they consider digital competence as one

of the basic competencies for their professional practice (Wagiran, 2019), while also expressing their willingness to use computer technology and e-learning (Hofmeister & Pilz, 2020).

3.2.2   Challenges

Key messages from the review on the issues and challenges VET educators face in using digital tools for teaching and learning are:

- Workload – as cited above, a key barrier to VET educators' increasing their digital competence is the restrictions placed on their professional development opportunities as a result of heavy curriculum workload. This was a common factor identified in a number of studies and reports, and common across the different countries covered
- Poor infrastructure networks and lack of IT support
- Inadequate training provision – including uneven distribution of training offers across the VET sector - and availability of easily accessible, mobile and inexpensive training programmes.

The German Digital Education Monitor study highlighted several barriers to using digital tools: failure to recognise their pedagogic potential; lack of a coherent digitisation strategy; poor infrastructure, access and IT support; lack of training.

A Spanish study on VET digital training highlighted excessive bureaucracy associated with daily teaching work - 81% of the sample surveyed in the study cited this – and the existence of an overloaded weekly teaching schedule - 75% cited this – as barriers to continuous training

The review highlighted some examples of efforts to improve the availability of digital training programmes for the VET sector. One example is the OPEN-AE Curriculum and online Toolkit on open source technologies addressed to e-facilitators working in non-formal adult education. It provides a blended course of 60 hours in open source technologies piloted with e-facilitators (adult trainers) to improve their knowledge of open digital learning technology and tools.

3.2.3   Educator needs

The key digital needs of VET educators identified by the review are:

- The ability to understand how digital tools can be used to keep learners engaged by applying them in new activities and new methods of learning
- Being able to design and implement an overall and integrated digital classroom strategy
- Being able to use digital tools to support inter-colleague collaboration and the production of joint resources for teaching and assessment
- Expertise in the technical functionalities of key classroom platforms and tools like digital whiteboard and the Moodle platform and how to use them in practice
- Ability to teach students about the responsible use of technology
- Ability to use digital tools to provide students with personalized learning opportunities (differentiation and personalization)
- Ability to use digital tools to teach students how to evaluate the reliability of online information (information and media literacy)
- Being able to use digital tools for problem-solving
- Applying digital tools to support learners in their vocational life, for example job-searching and, more generally, to support a stronger alignment between classroom and work-based learning.

A key finding from the review is that VET educators routinely work at the interface between education and work. For example, one report from Sweden describes the need to involve industrial partners to "create a stronger alignment between work-based and school-based learning". The report also describes the lack of industry-based internships and on the job training. An implication is that digitally competent VET training can give students advantages in an increasingly technologized workplace.

3.2.4   Learner Needs

The key digital needs of disadvantaged learners identified by the review are:

- Acquisition of a basic technical skills level that is grounded in knowledge of the main systems, platforms and applications, knowledge of information sources and processing, creation of content, problem-solving and information evaluation
- In addition, training in applied digital skills that moves beyond basic core skills to provide learning outcomes that can enhance their employment opportunities, supported by on the job placements that can enable them to apply their new skills in practice
- Flexible learning environments that reduce barriers between teacher and students, increase the range of educational modalities and spaces to work in and and increase both teacher-student and student-student interactivity
- Scaffolded learning that is adapted in pace to the learners' own pace
- Learning involving the use of digital tools that reflect learners' lifestyles and lived experience, their aspirations and their experiences of education.

Although there was a common strand in the literature that recognised the need to equip learners with the basic tools to understand and use digital technologies in routine classroom practice, a strong message from the review was that basic skills are not enough, and that contextualisation and adaptation are key. In this regard, three main themes could be highlighted across the literature and the countries covered on the needs of disadvantaged learners. One key theme focuses on disadvantaged learners' attitudes towards, and experience of traditional classroom teaching – typically seen as negative and de-motivating. A number of studies and reports referred to problems vulnerable VET learners faced in adapting to the educational environment, low levels of curricular competence, difficulty in accepting the educational institution's operating rules, conflicts among peers, low self-esteem and lack of motivation (Cacheiro, García and Moreno, 2015), in addition to presenting with disruptive behaviours (Aramendi and Vega, 2013) and family problems (Carrillo, 2013). These findings were echoed by the analysis of initiatives aimed at engaging vulnerable learners in innovate vocational training programmes in the UK and elsewhere. A second key theme focuses on the disconnection between classroom digital life and extra-curricular life, with a number of studies, for example, demonstrating that most vulnerable learners don't use their personal devices for learning purposes but for peer communication, games and entertainment. A third theme highlights the gap between the world of learning and the world of work. Good practice cases from Italy, for example, suggested that disadvantaged VET learners in particular need to be trained not only in generic digital skills but in those digital skills that are specific for the labour market and which can increase their employability (e.g. digital skills for marketing, for visual communication, and for administrative tasks). This works best when accompanied by support in approaching potential employers (through an internship or similar type of work placement) where the initial approach is done by the training provider to ensure the learner's profile matches the profile the employer is looking for. This means they need a training programme that adapts to their learning pace, captures their attention and keeps it alive, in an environment that is different from the school environment and that doesn't impose collective classroom work. However they also need a more structured training to perfect the skills they have achieved through self-learning and to create a connection with potential employers and the work market in general.

3.2.5   Competence Framework structure

The review focused in particular on understanding how digital competence frameworks should be structured, particularly in the VET sector. The key findings of the review were:

- Competence frameworks for VET educators and learners should not simply include technical skills but should deliver a holistic approach incorporating technical skills, methodological skills, social skills and interpersonal skills, including social and communication skills, teamwork and autonomy
- There needs to be an emphasis on media literacy
- In addition to a solid core of generic and technical skills and competencies, skilled workers will need digital, problem-solving and knowledge management skills
- Vet educators need to become familiar with the skills needed to work in 'hybrid' teaching and learning scenarios and systems that deliver blended learning
- VET digital competence frameworks need to reflect existing EU standards, because there is currently no agreed framework for VET digital competences. These standards should include DigCompEdu, the European Qualifications Framework for lifelong learning (EQF) and the European Credit System for Vocational Education and Training (ECVET)

Six specific examples of digital competence frameworks used in the education and training field were selected for intensive review, on the grounds of the frequency of their citation in the literature. Four of these are 'generic' digital competence frameworks for educators:

- DigCompEdu
- UNESCO ICT Competency Framework for Teachers
- Technological Pedagogic Content Knowledge framework – TPACK
- Mentoring Technology Enhanced Pedagogy – MENTEP.

Two are digital competence frameworks designed specifically for VET educators:

- Digital Teaching Professional Framework – DTFP
- Vocational Education and Training Teachers Embracing Digital Disruption – VET-TEDD.

These are briefly described below.

DigCompEdu

The European Competence Framework for the Digital Competence of Educators (DigCompEdu) [9] was developed by the European Commission's Joint Research Centre -JRC-Seville - in 2017. The DigCompEdu Framework consists of 6 'competence areas' – organised in three 'domains'- each of which covers a number of specific digital competences – making 22 competences in total, as shown in Figure 4.
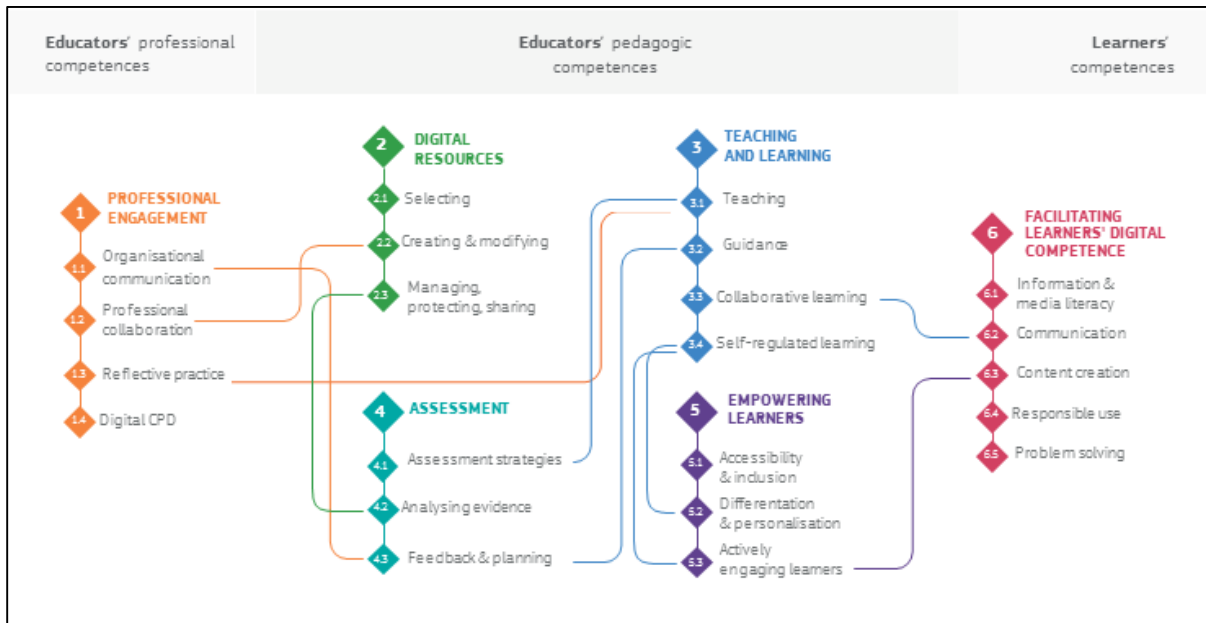
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[9] http://europa.eu/!gt63ch

Figure 4: the DigCompEdu competence framework

Each competence in the framework consists of four elements:

- Competence descriptor - the title and a short description. For example, for competence 1.1 – 'Organisational communication' – the Competence descriptor is: "To use digital technologies to enhance organisational communication with learners, parents and third parties. To contribute to collaboratively developing and improving organisational communication strategies".

- Activities - a list of activities that are examples of the competence. For example competence 1.1 has eight activities, including 'to contribute with content to the organisation's website or virtual learning environment'.

- Progression levels – a description of how the competence is expressed at different levels. These are intended to help educators understand their personal strengths and weaknesses, by describing different stages or levels of digital competence development. DigCompEdu used a progression model based on the Common European Framework of Reference for Languages (CEFR), which has 6 progression levels ranging from A1 – 'Newcomers' – who can recall facts and basic concepts – to C2 'Pioneers' – who can develop new practices. The categorisation in turn reflects Blooms taxonomy of learning progression, which has six levels from 'remember' – the ability to recall facts and basic concepts – to 'create' – producing new or original work.

- Proficiency levels – a list of statements exemplifying typical activities at each proficiency level. In DigCompEdu, a set of 'proficiency statements' were developed for each progression level to enable educators to understand where they are along the pathway from 'newcomer' to 'pioneer'. These proficiency levels are cumulative, so, for example, to be categorised as Level B2 – Expert – an educator must be able to tick each preceding proficiency statement box at levels B1, A2 and A1. One of the two proficiency statements for Level B2 goes "I select the most appropriate channel, format and style for a given communication purpose and context". In order to make it clear at which progression level an educator is situated on a particular competence some kind of assessment procedure is required. In DigCompEdu this assessment used a 'self-reported' methodology in which an educator was required to indicate 'yes' or 'no' to a proficiency statement. So, with regard to DigCompEdu competence 1.1 – 'Organisational communication', the educator would be presented with the set of proficiency statements and

they would tick the 'Yes' or 'No' box for each statement. The cumulative total of 'Yes' scores would then compute their proficiency level and their progression level.

Three distinctive features of the DigCompEdu competence framework are of particular interest for FLEXICOMP:

- First, digital competences are not separated from pedagogic competences. Rather, they are embedded within teaching and learning practice and their associated competences. Clustering of competences is organised around the three domains of educators' professional competences; educators' pedagogic competences and learners' competences.

- Progression and proficiency levels map on to established theoretical models – in this case Bloom's taxonomy – but this creates quite a complex proficiency and progression pathway for educators to understand and buy into.

- Calculating proficiency level relies on self-assessment by the educator - in the DigCompEdu case the educator stating yes or no to a proficiency statement. Another way of assessing proficiency and progression levels is to use a self-assessment rating scale for a proficiency statement, for example: rate your level of competence on the following: "I communicate responsibly and ethically with digital technologies e.g. respecting netiquette and responsible use policies" on a scale of 1 to 5, where 1 is 'I can't do this' and 5 is 'I can do this very well'.

More recent developments of DigCompEdu are exploring how proficiency and progression levels can be assessed less subjectively. JRC-Seville are currently implementing a project called – DigCompEduSAT - which is looking at ways in which proficiency and progression levels could be assessed using **situational knowledge-based question items** to illustrate the use of digital competences in different teaching contexts. Unlike self-assessed ratings of digital competences, knowledge-based questions test the user's level of competences by situating the use of digital tools in actual teaching practice. A knowledge-based question, in the context of assessing the digital competences of educators, therefore "assesses pedagogic competences in dealing with situations of the use of digital competences in educational settings". An example is shown in the Box below for DigCompEdu competence 1.1 'organisational communication'. [10]

You want to encourage your learners to regularly communicate in support of their collaborative working. After consultation with them, what action might you take to help them with this process? Choose **one** answer.

1. Organise regular face-to-face consultation events on issues and challenges they face
2. Set up a pilot collaborative environment with them that demonstrates group messaging and file sharing
3. Run an on-line survey to capture issues and challenges they may be facing
4. Run regular consultation events using a teleconferencing system

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[10] Cullen, J (2019). Deliverable 2: Report on the content and structure of DigCompEduSat. Seville: JRC Seville

UNESCO ICT Competency Framework for Teachers

The UNESCO ICT CFC was developed in 2018 to guide pre- and in-service teacher training on the use of ICTs (Information and Communication Tools) across the education system [11].   It consists of 18 competences organised across six areas (Figure 5)
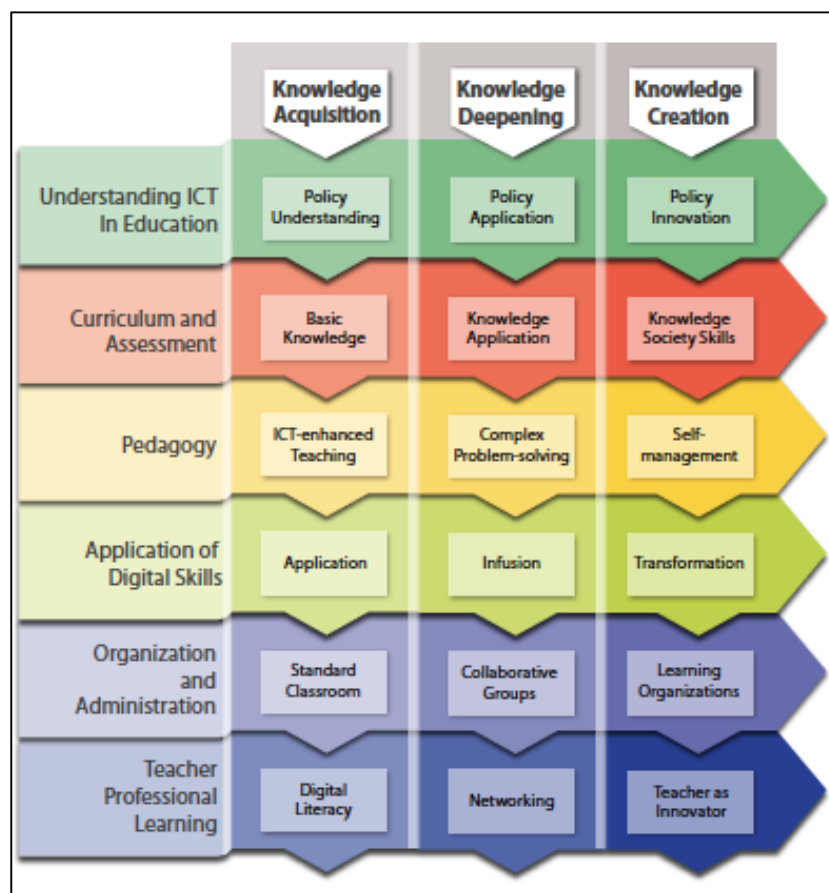
Figure 5: UNESCO ICT CFC

The six competence areas cover:

- Understanding ICT in Education Policy
- Curriculum and Assessment
- Pedagogy
- Application of Digital Skills
- Organization and Administration
- Teacher Professional Learning.

Each competence area is associated with three progression levels that reflect three successive stages or a teacher's development in making pedagogical use of ICT. The first level is Knowledge Acquisition, where teachers acquire knowledge about using technology and basic ICT competencies. The second level is Knowledge Deepening, where teachers acquire ICT competencies that enable them to facilitate learning environments that are student-centred, collaborative and cooperative in nature. The third level is Knowledge Creation , where teachers acquire competencies that encourage them to model good practice, and set up learning environments that encourage students to create "the kind of new knowledge required for more harmonious, fulfilling and prosperous societies".

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[11] UNESCO (2018). UNESCO ICT Competency Framework for Teachers. Paris: UNESCO.
   https://unesdoc.unesco.org/ark:/48223/pf0000265721

Technological Pedagogic Content Knowledge framework – TPACK

TPACK is less of a 'formal' digital competence framework and more of a flexible pedagogic approach to support the use of digital technologies in teaching and learning [12]. As such, it avoids making distinctions and categorisations between 'technical' and 'pedagogic' aspects of teaching and learning and instead presents digital technologies in teaching and learning as spheres of influence that interlock and which are in turn shaped by 'context' – the particular features and characteristics that apply in different sectors, places and organisations (Figure 6)
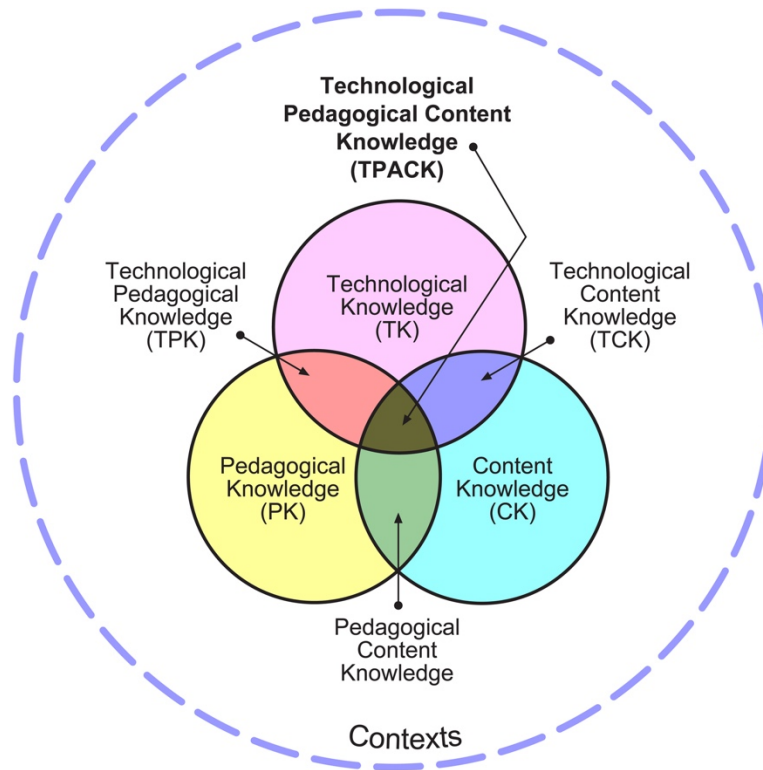
Figure 6: TPACK framework. Source: tpack.org

The framework consists of three knowledge areas:

- **Content Knowledge (CK)** – this describes teachers' own knowledge of the subject matter, and can include knowledge of concepts, theories, evidence, and organizational frameworks within a particular subject matter, as well as the field's best practices and established approaches to communicating this information to students. It will vary according to discipline and grade level.
- **Pedagogical Knowledge (PK)** – this describes teachers' knowledge of the practices, processes, and methods regarding teaching and learning. It incorporates the purposes, values, and aims of education, and may apply to more specific areas including the understanding of student learning styles, classroom management skills, lesson planning, and assessments.
- **Technological Knowledge (TK)** – this describes teachers' knowledge of, and ability to use, various technologies, technological tools, and associated resources, including their possibilities for a specific subject area or classroom.

These three knowledge areas overlap and interact in four combinations:

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[12] Koehler , M J, Mishra, P , Kereluik, K, Tae Seob Shin, and Graham, C (2014). The Technological Pedagogical Content Knowledge Framework. In J.M. Spector et al. (eds.), Handbook of Research on Educational Communications and Technology, 5_9. New York: Springer

- **Technological Content Knowledge (TCK)** – this describes teachers' understanding of how technology and content can both influence and push against each other. It involves understanding how the subject matter can be communicated via different technology offers.

- **Technological Pedagogical Knowledge (TPK)** – this describes teachers' understanding of how particular technologies can change both the teaching and learning experiences.

- **Pedagogical Content Knowledge (PCK)** – this describes teachers' knowledge around core areas of teaching and learning, including curricula development, assessment, and reporting results.

- **TPACK** - **Technological Pedagogic Content Knowledge** - is the end result of these various combinations and interests, drawing from them – and from the three larger underlying areas of content, pedagogy, and technology – in order to create an effective basis for teaching using educational technology.

Mentoring Technology Enhanced Pedagogy – MENTEP

MENTEP is a digital competence framework and self-assessment - tool – TET-SAT - developed through the EU Erasmus+ programme [13]. It covers four competence areas with 14 competences in total:

- Digital pedagogy
  - Plan and implement teaching with ICT (Learning Design)
  - Design and manage ICT based learning environments
  - ICT supported assessment
- Digital content use and production,
  - Selection and use of digital resources
  - Creative Production
  - Copyright and Licenses
  - Programming
- Digital communication and collaboration
  - Communicating using technologies and social media
  - Online participation
  - Collaboration through ICT
- Digital citizenship.
  - Online behaviour
  - Digital Identity Management
  - Device Protection
  - Health and the Environment

The framework incorporates five progression levels: Starter, Beginner, Capable, Proficient, Expert.

Digital Teaching Professional Framework

The Digital Teaching Professional Framework [14], developed by the UK Education and Training Foundation, is an adaptation of DigCompEdu specifically to the VET sector, but also incorporates the Education and Training Foundation Professional Standards (PS) and JISC's Digital capabilities framework (Figure 7). As Figure 7 shows DTPF covers seven competence areas, representing 20 competences in total:

- Planning your teaching, incorporating Planning and looking for Information; Designing and adapting activities; Support for learning and support activities; Communication and

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[13] http://mentep.eun.org/outputs
[14] https://www.et-foundation.co.uk/supporting/edtech-support/digital-skills-competency-framework/

collaboration.

- Approaches to teaching, incorporating Teaching and learning resources; Teaching context: face-to-face; Teaching context: fully online

- Supporting learners to develop employability skills, incorporating Supporting Digital capabilities; Supporting study skills; peer support;

- Subject and Industry specific teaching, incorporating Teaching: subject-specific and industry-related; Raising learners' digital employability and self-employability skills

- Assessment, incorporating Assessment and feedback

- Accessibility and inclusion, incorporating accessibility; equality and diversity

- Self-development, incorporating Progression and CPD; Progression and CPD; Managing identity.
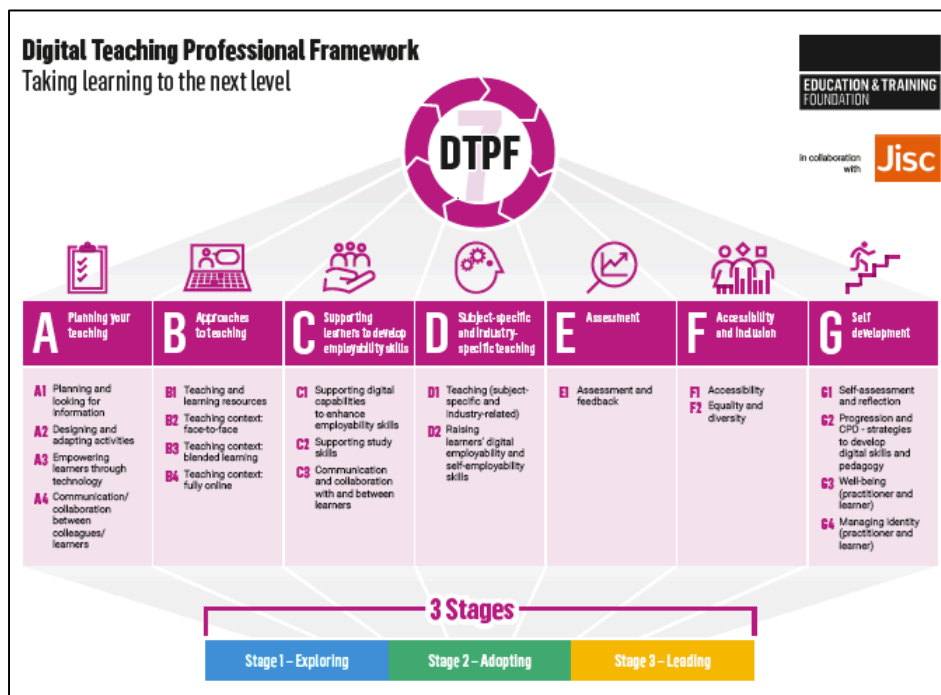
Figure 7: Digital Teaching Professional Framework.
Source: Education and Training Foundation

DTPF has compressed the six proficiency levels used in DigCompEdu to three competence levels:

- Stage 1: Exploring – practitioners assimilate new information and develop basic digital practices.
- Stage 2: Adopting – practitioners apply their digital practices and expand them further.
- Stage 3: Leading – practitioners pass on their knowledge, critique existing practice and develop new practices.

Vocational Education and Training Teachers Embracing Digital Disruption – VET-TEDD

Like MENTEP, VET-TEDD is a competence framework and self-assessment tool developed through the EU Erasmus+ programme [15] but is focused specifically on VET educators. The framework and tools map on to a digital competence training programme which has six modules:

- Digital Identity
- Security and data handling
- Alternative and simulated environments
- Digital Education Methodologies
- Digital Education Models
- Media Rich content.

The self-assessment tool uses a five point scale that gets VET educators to rate themselves on the digital competences in the framework in terms of their self-reported level. This links to a progression model within the tool and training programme that covers five levels from 'novice' to 'expert'.

The six frameworks reviewed were mapped against each other to identify their convergences and divergences. The TPACK framework was omitted from the mapping because of its different orientation – based on interlocking 'spheres of knowledge' . Table 4 summarises the results of this mapping exercise.

Table 4: Digital Competence Framework Map

DigcompEdu	UNESCO	MENTEP	VET-TED	DTPF
Professional engagement	Teacher professional learning	Digital communication & Collaboration		Self-development
Digital resources	Organisation & Administration	Digital content use & production		
Assessment	Curriculum & assessment			Assessment
Teaching & Learning	Understanding ICT in education Pedagogy; Application of digital skills	Digital pedagogy	Digital Education Methodologies Digital Education Models	Planning your teaching; approaches to teaching
Empowering learners			Digital Identity; Security and data handling	Accessibility & Inclusion
Facilitating learners' digital competences		Digital citizenship		
				Supporting learners to develop employability skills
				Subject and Industry specific teaching,
			Alternative and simulated environments	
			Media Rich content	

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[15] https://vet-tedd.eu/en/

As Table 4 shows there is significant overlap across the different competence frameworks in terms of core (common) areas, highlighted in blue. These common core areas can be described as:

- Teacher development and collaboration
- Working with digital resources
- Assessment
- Approaches to teaching and learning
- Empowering learners and protecting their security.

In addition to these core areas, the 'VET-focused' frameworks cover two additional areas (highlighted in grey): work and industry-focused competences and using 'alternative' and 'disruptive' digital tools.

3.2.6   Training Content

This part of the review focused on identifying the content areas that need to be included in digital competence training programmes in the VET sector. The key findings from the review were:

- Training programmes for VET educators and learners need to be holistic and multi-disciplinary, combining technical skills, social skills, interpersonal skills and skills specifically oriented to the needs of disadvantaged and vulnerable learners
- There needs to be an emphasis on supporting VET educators to help adult learners prepare for integration with the labour market. Specific knowledge is needed for the different sectors of the economy, and there are several basic and industry-specific requirements for work
- The literature review highlighted common themes across the EU in terms of the core content areas that digital competence training programmes for VET educators need to cover. These core content areas include classroom management, student engagement, instructional design, content creation, lesson planning, assessment, data security and responsible use, digital literacy.

A good example of 'multidisciplnary skills training' for VET educators is 'Juventud Activa', which provides a training programme in three content areas: Community Manager - specialized training in online marketing management from social networks and management of social networks; Social and health care for dependency - specialized training in care for people in a situation of dependency in centres and in community environments, with a Certificate of Professionalism in Social and Health Care for Dependent Persons in Social Institutions; Big data: specialized training in the creation of digital value proposals through web design.

'Creating Possibilities for Integration of Young People on the Labour Market' is an initiative that aims to provide VET educators with the skills to support young people in their efforts to enter the labour market. It emphasises the need for VET educators to know how different sectors of the economy work and what are the requirements of specific industry sectors.

3.2.7   Disadvantaged learners

This part of the review focused on identifying the Issues and challenges that need to be addressed in working with disadvantaged learners and the 'hard to teach'. The key findings from the review were:

- The review highlighted a need for providing VET educators with training to work with vulnerable adults specifically
- Disadvantaged and vulnerable learners need digital skills training particularly in areas related to improving their economic prospects, for example by carrying out job searches and acquiring entrepreneurial skills, as well as employability training, including specific skills like cv writing and interviewing techniques
- The review highlighted a need to provide disadvantaged learners not only with 'basic' skills in mainstream digital tools (for example word processing and spreadsheets) but also training in

how to use more advanced and innovative tools, for example web design, online collaboration tools, 'easy' coding applications, mobile apps, and video and radio.

One example on working with vulnerable adults highlighted in the review was 'Digital Champions for Community Success'. This project provides a training package for adult educators, trainers and carers who work with vulnerable adults in different communities. It incorporates three core modules: Digital Skills, which presents in 6 thematic groups various digital skills necessary to navigate modern life; How to be a Digital Champion, which focuses on the competences that an educator working with vulnerable adults should acquire in order to improve their practice; How to become a Digital Champion, which describes the best practice when identifying suitable members of a community to become digital champions.

An example of supporting vulnerable adults to improve their economic prospects is 'Get ConNEcteT to the job market', a project which aimed to promote the entrepreneurial spirit of adult learners using social media and ICT to create new e-enterprises, providing them with increased opportunities for being incorporated in the labour market. Another example is 'Eskills for the unemployed', which provides support for vulnerable adults in IT courses with recognized qualifications to support them in finding a job or engaging in entrepreneurship activities, as well as job search training.

An example of delivering training to support vulnerable and disadvantaged learners in acquiring skills to use more advanced and innovative digital tools is 'Generation 0101', which provides modules in e-journalism, web design, online collaboration tools, coding, video, mobile applications, and community radio.

3.2.8   Pedagogy

This part of the review focused on identifying the pedagogic methods that are likely to work best in delivering digital skills training in the VET sector. The key findings from the review were:

- There is substantial evidence that blended and hybrid learning environments are likely to deliver the best teaching and learning outcomes, rather than focusing entirely on on-line delivery or traditional 'face to face' delivery
- In addition, VET pedagogic approaches should incorporate an element of 'learning by doing', for example involving work experience and work placements for students, as well as project-based learning
- On-line teaching and learning should incorporate pedagogic methods and tools that support interactivity – for example game-based learning – and include group interactivity, for example collaborative learning tools, as well as methods that support creativity and experimentation
- Flexibility is key to effective teaching and learning outcomes. This is linked to using open technologies and resources to support collaboration as well as personalisation.

An important strand of pedagogic thinking highlighted in the review was creating a teaching and learning environment that balances mainstream and core knowledge with problem-solving, creativity and experimentation (Bohne et. al., 2017). These kinds of 'flexible' pedagogic environments support participatory and personal, as well as technical and methodological learning, and speak to a key need in VET to inculcate cross-sectional and contextual competences that are acquired through different experiences (Samanes and Clares, 2108) as well as the need to support students to be able to 'actively shape work within the context of social development' (Bohne et. al., 2017) and become more 'customer-oriented' (Wild and Schulz, 2020). Flexibility requires additional pedagogic methods and tools above and beyond 'learning'. These include technology mastery, social intelligence, innovative thinking, multidisciplinarity. Interculturality and critical thinking (García-de-Paz and Bonilla, 2021).

3.2.9   Support

This part of the review focused on identifying the support services that are likely to be needed in delivering digital skills training to VET educators, and which support services are likely to be needed in delivering digital skills training to disadvantaged learners. The key findings from the review were:

- VET educators and learners not only require 'in-classroom' support but external support to help them deliver on things like being attuned to economic and industry needs, providing placements and work experience. This implies mentoring to develop 'soft' skills like self-presentation, strong networking relations with local/regional SME's, and connection with the work market and creation of contacts with potential employers.
- The new pedagogic innovations associated with the more extensive introduction of digital tools into the VET learning environment bring with them a requirement for organizational flexibility. The new ways of working - involving intermodularity, self-management, teacher and student empowerment - require flexibility in curriculum schedules, in the organization of spaces, and in the organization of work teams.
- The transition to more on-line instruction for both educators and learners implies significant technical support – not only in terms of basic IT support but, for example, the provision of on-line help to deal with problems like support with an on-line student assignment.
- Working with vulnerable and disadvantaged learners typically requires more significant resources being devoted to providing pastoral support, in particular to address the problems vulnerable VET learners faced in adapting to the educational environment. These learners often need specialist support to help them overcome things like lack of trust in the system, low self-esteem and lack of motivation. In turn, VET educators need to be supported to address challenges around things like disruptive behaviour.

As noted above, for example in the German Digital Education Monitor study, the review highlighted bureaucratic issues – including lack of a coherent digitisation strategy, poor technical infrastructure, access and IT support as a major problem that needed to be addressed through organisational innovation. , and a Spanish study on VET digital training highlighted excessive bureaucracy associated with daily teaching work as key barriers to successful VET educator training. Other studies and reports highlighted the need for closer collaboration with industry stakeholders (Vodaphone Italia Foundation, 2021).

A number of studies and reports referred to problems vulnerable VET learners faced in adapting to the educational environment, low self-esteem and lack of motivation (Cacheiro, García and Moreno, 2015), in addition to presenting with disruptive behaviors (Aramendi and Vega, 2013) and family problems (Carrillo, 2013). These findings were echoed by the analysis of initiatives aimed at engaging vulnerable learners in innovate vocational training programmes in the UK and elsewhere. An example of one initiative that developed a training programme to support educators and youth workers working with vulnerable groups is 'COMANITY'. This aimed to create a new role – the 'Community Animateur' – who acts as a "social mediator", bridging the gap between young people who feel they've been left on 'on the margins' and 'mainstream' institutions. The Community Animateur training programme combined self-directed learning with collaborative learning methods (in online groups and with the COMANITY team) to help youth workers, educators and volunteers to generate their own learning content, using their practice experiences; share their experiences and learning; apply it in practice, and assess their progress. One of the core modules in the training programme supports trainees in the acquisition of 'enabling emotional intelligence' competences that help them work collaboratively with vulnerable groups and provide pastoral support to address challenges like low motivation.

4. FLEXICOMP Competence Framework

This section draws together the results of the state of the art review and lifeworld analysis to develop the FLEXICOMP Competence framework. It begins by setting out the overall approach and design principles of the framework. This is followed by a presentation of the framework in detail.

4.1 Overall approach and design principles

4.1.1 Overall approach

The over-arching approach to designing the FLEXICOMP competence framework takes as its starting point the CEDEFOP definition of competence:

> *"Competences usually refer to practices in the workplace and, by extension, to wider social and personal practices. Accordingly, learning outcomes are validated by their connection to competences".[16]*

In line with this definition, knowledge, skills and attitudes are considered within competences as an open set of changeable examples rather than a discrete set of immovable structural entities (Valenta et. al.,2012).[17] Competences are therefore defined as a dialectical progression of knowledge, skills, attitudes and purposes, where broader competence areas derive from the socio-economic context and are translated into learning outcome examples. This perspective is core to recent initiatives that have developed to standardize competences at the EU level – for example the European Digital Competence Framework recently developed by the European Commission's Joint Research Centre, JRC-Seville, as presented above in Section 3.[18]

Since knowledge, skills and attitudes are embedded in and illustrated by examples of learning outcomes, they are not seen as essential requirements but examples of how a competence can manifest itself through observable instances of the application of a person's knowledge, skills and attitudes. The Learning Outcomes are particularly important for FLEXICOMP because they directly link to the online training course structure and content and to the assessment approach, which is a 'quiz-based' tool designed to assess the extent to which a VET educator is able apply digital competences competences in their practice by choosing the right option in challenging teaching and learning situations.

Competence framework structure

The state of the art review and lifeworld analysis suggest that the FLEXICOMP framework design should be built around three high level competence domains. These reflect to some extent the three high level themes incorporated in DigCompEdu:

- Domain A – Core (Generic) Digital Competences. This speaks to the 'Educator professional competences' in DigCompEdu, as well as some of the 'Educator pedagogic competences' in DigCompEdu. It covers the basic digital competences VET educators would need to apply digital tools successfully in their practice

- Domain B – Enabling Digital Competences. This speaks mainly to the 'Learners' competences' element in DigCompEdu and focuses on supporting VET educators in collaborating with learners in the classroom and facilitating their acquisition and application of digital skills

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[16] CEDEFOP (2014). Terminology of European Education and Training Policy. Second Edition. Luxembourg: Publications Office of the European Union.

[17] Valenta, L, Perez-Garcia M, Suba, E, Zeigler, P (2013) Carer+: Towards a Digital Competence Framework for care workers in domiciliary care. Proceedings of the EDEN Annual Conference. Oslo.

[18] https://publications.jrc.ec.europa.eu/repository/bitstream/JRC83167/lb-na-26035-enn.pdf

- Domain C – FLEXICOMP-specific competences. This domain focuses on two key aspects that are specific to FLEXICOMP. Firstly, the need to apply digital tools to support the needs of adult learners in the VET sector. Secondly, the need to equip VET educators with the skills needed to work with vulnerable and disadvantaged people in that sector.

These three domains are associated with eight competence areas. Each competence area covers a set of specific competences, providing 26 competences in total within the framework, as shown in Figure 8.
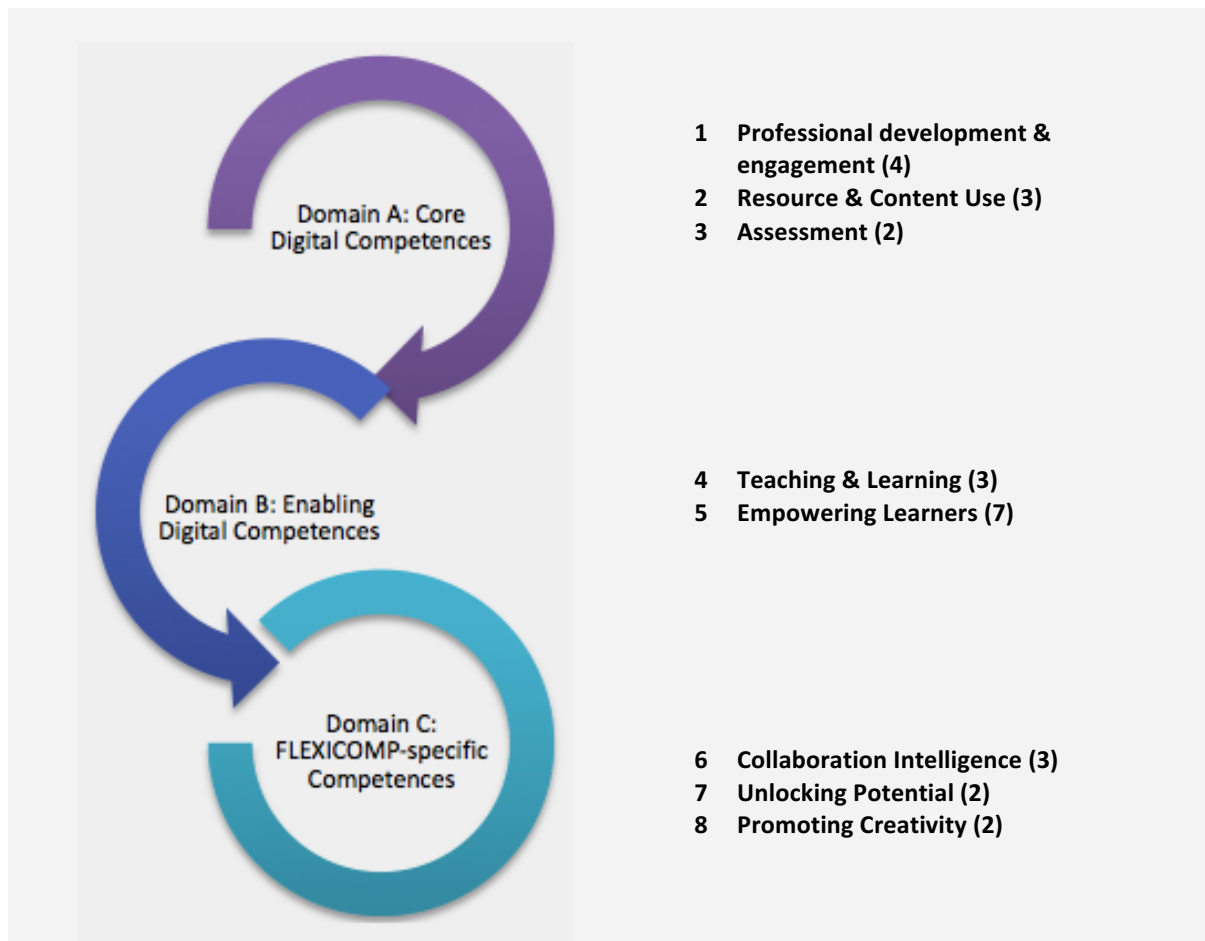

Figure 8: FLEXICOMP Competence framework

Table 5 provides a summary of the competences in the framework by competence domain and area together with a short description of each competence.

Table 5: FLEXICOMP competence framework summary

Domain A: Core digital competences		
Area	**Competence**	**Description**
1. **Professional development & engagement**	1.1 Organisational communication	Using digital tools for communication with colleagues, learners, stakeholders
	1.2 Professional collaboration	Using digital tools to collaborate with colleagues, learners, stakeholders
	1.3 Reflective practice	Assess and actively develop one's VET competence and practice.
	1.4 Digital personal development	Use digital sources and resources for continuous professional development
2. **Resources & Content Use**	2.1 Selecting digital resources	Identify, assess and select digital resources for VET teaching
	2.2 Creating and modifying digital resources	Identify, assess, modify, select and create new digital resources for VET teaching
	2.3 Managing, protecting and sharing digital resources	Organise digital content and make it available to VET learners and other stakeholders
3. **Assessment**	3.1 Assessment strategies and tools	Make decisions about which digital tools to use to help educators and learners identify how they are progressing
	3.2 Using assessment results for feedback and reflection	Use digital tools and their assessment results to give better feedback
Domain B – Enabling Digital Competences		
Area	**Competence**	**Description**
4. **Teaching & Learning**	4.1 Learning design & planning	Design and plan effective teaching & learning activities using digital education methods
	4.2 Digital learning environments	Choose and configure the right digital tools for different learning situations
	4.3 Guidance and support	Provide appropriate digital guidance and support to learners
5. **Empowering learners**	5.1 Accessibility and inclusion	Ensuring accessibility to learning and development resources and activities, for all VET learners , including those with complex needs
	5.2 Actively engaging vulnerable learners	Use digital technologies to create a rich and relevant learning environment
	5.3 Information and media literacy	Support learners to address their information needs
	5.4 Understanding on-line life	Keep up to date with digital needs of VET learners and provide support to meet them
	5.5 Digital content creation for empowerment	Use innovative tools to help learners meet their goals
	5.6 Responsible use	Apply strategies to ensure online safety of learners
	5.7 Digital problem solving	Help learners acquire skills to use digital tools to solve problems
Domain C – FLEXICOMP-specific competences		
Area	**Competence**	**Description**
6. **Collaboration Intelligence**	6.1 Inter-personal competences	Apply empathy, social responsibility and relationship-handling in teaching activities
	6.2 Conflict management	Avoid and resolve classroom conflict situations
	6.3 Resilience building	Use active listening and inter-cultural awareness to help vulnerable learners overcome barriers
7. **Unlocking Potential**	7.1 Supporting employability and development	Use digital tools to support learners' employment, entrepreneurship and development
	7.2 Subject and Industry-specific teaching	Use digital tools to identify and take advantage of new practices and opportunities in your field
8. **Promoting creativity**	8.1 Working with hidden talent	Use digital tools to surface and valorise the talents of disadvantaged learners
	8.2 Promoting creativity and out of the box thinking	Designing and running activities that enable disadvantaged learners to solve problems in radical ways

Progression levels

Progression levels are intended to help VET educators understand their personal strengths and weaknesses, by describing different stages or levels of competence development. The proposed progression approach in the FLEXICOMP competence framework works in two ways. Firstly, progression is embedded within the competence framework structure itself, which moves from the acquisition of generic (core) competences in Domain A, through acquiring more advanced and complex competences that support teacher-learner collaboration in Domain B – 'enabling' digital competences - to applying these sets of core and enabling competences in VET and industry specific situations, working with disadvantaged learners, in Domain C. Second, each competence within the framework has three levels of proficiency:

- Level 1: Basic level
- Level 2: Intermediate level
- Level 3: Advanced level.

This compresses the six proficiency levels in DigCompEdu - A1 – 'Newcomers' to C2 'Pioneers' – to three, since the evidence from the review and LWA suggests educators are more comfortable with fewer progression levels. The three progression levels are in line with the DTPF framework discussed above in Section 3 - Stage 1: Exploring – practitioners assimilate new information and develop basic digital practices; Stage 2: Adopting – practitioners apply their digital practices and expand them further; Stage 3: Leading – practitioners pass on their knowledge, critique existing practice and develop new practices.

In FLEXICOMP, progression levels are incorporated in the Training Course – IO2, discussed in Section 5 below. Each module of the training course incorporates 'quizzes' that use 'situational knowledge-based questions' that assess the extent to which trainees can apply the competences covered by the module in actual teaching practice. These quizzes are graded on level of difficulty corresponding to 'Basic', 'Intermediate' and 'Advanced'. Equally the interactive game requires participating educators to adopt the most appropriate response to classroom situations. By progressing through the different levels in the game, educators demonstrate their increasing mastery of the competence areas on which the training course is based.

4.2   Elaborated competence framework

Putting the approach into practice, presented below is the FLEXICOMP Competence Framework in detail. This describes the three competence areas, their associated competences and Learning Outcome Examples for each competence, broken down into knowledge, skills and attitude examples.

DOMAIN A: CORE DIGITAL COMPETENCES

Competence Area	A1: Professional development and engagement
Competence title	1.1 Organisational communication
Competence description	To use digital technologies to enhance organisational communication with colleagues, learners, stakeholders and other third parties
Knowledge examples	Knows how to elect the most appropriate channel, format and style for a given communication purpose, audience and context.
Skills examples	Make use of digital technologies for communication e.g. with colleagues, VET learners, stakeholders
Attitude examples	Willing to reflect on and discuss how digital technologies are used effectively for organisational communication

Competence Area	A1: Professional development and engagement
Competence title	1.2 Professional collaboration
Competence description	To use digital technologies to engage in collaboration with other VET educators, sharing and exchanging knowledge and experience, and collaboratively innovating VET practices.
Knowledge examples	Knowledge of relevant technology platforms and tools for sharing
Skills examples	Applies tools like social media to share information
Attitude examples	Willing to improve on and expand practice through use of digital tools

Competence Area	A1: Professional development and engagement
Competence title	1.3 Reflective practice
Competence description	To individually and collaboratively reflect on, critically assess and actively develop one's VET competence and practice.
Knowledge examples	Knows which professional development websites to go to to get new ideas
Skills examples	Able to use on-line forums to catch up on latest developments
Attitude examples	Willing to experiment with new VET practices through digital technologies

Competence Area	A1: Professional development and engagement
Competence title	1.4 Digital personal development
Competence description	To use digital sources and resources for continuous professional development
Knowledge examples	Knows how to use the internet to improve or update skills
Skills examples	Can participate in online courses, webinars, or consult digital training materials and video tutorials
Attitude examples	Enthusiastic about improving digital competences

Competence Area	A2. Resources and Content Use
Competence title	2.1 Selecting digital resources
Competence description	To identify, assess and select digital resources for VET teaching. To consider the specific objective, context, engagement approach, and user group, when selecting digital resources and planning their use.
Knowledge examples	Awareness of common platforms which provide resources.
Skills examples	Evaluates the reliability of digital resources found online and checks their suitability for target group and specific development objective
Attitude examples	Strategic and reflective approach to digital resources

Competence Area	A2. Resources and Content Use
Competence title	2.2 Creating and modifying digital resources
Competence description	To modify and build on existing openly-licensed resources and other resources where this is permitted. To create or co-create new digital VET resources.
Knowledge examples	Knows how to make modifications to digital resources to fit them to different classroom settings , e.g. editing or deleting parts, adapting the general settings.
Skills examples	Integrates a range of interactive elements and games into self-created instructional resources
Attitude examples	Creative attitude to using digital resources

Competence Area	A2. Resources and Content Use
Competence title	2.3 Managing, protecting and sharing digital resources
Competence description	To organise digital content and make it available to VET learners and other stakeholders. To effectively protect sensitive digital content.
Knowledge examples	Knows how to respect and correctly apply privacy and copyright rules
Skills examples	Share content on virtual learning environments or by uploading, linking or embedding it e.g. on a website or blog
Attitude examples	Respect for privacy

Competence Area	A3: Assessment
Competence title	3.1 Assessment strategies and tools
Competence description	To understand, evaluate and make decisions about which digital tools to use to help educators and learners identify how they are progressing in relation to desired learning outcomes
Knowledge examples	Knows about the different types of digital assessment tools available, what their functionalities are and what works in which circumstances
Skills examples	Work with students to create e-portfolios to showcase their work over a semester
Attitude examples	Open and flexible to different types of assessment strategy

Competence Area	A3: Assessment
Competence title	3.2 Using assessment results for feedback and reflection
Competence description	To use digital tools and their assessment results to give better feedback to educators, learners and other stakeholders, so as to improve desired learning outcomes
Knowledge examples	Knows how to provide personal feedback and offer differentiated support to learners, based on the data generated by the digital technologies used
Skills examples	Use an interactive puzzle-type game, where learners' game-play results present which goals they have met
Attitude examples	Awareness that vulnerable learners sometimes are anxious and distrustful of being 'tested'

DOMAIN B – ENABLING DIGITAL COMPETENCES

Competence Area	B4: Teaching & Learning
Competence title	4.1 Learning design & planning
Competence description	Design and plan effective teaching & learning activities using digital education methods
Knowledge examples	Knowing about and aligning digital and didactic/pedagogic/methodological strategies
Skills examples	Applying a flipped classroom approach in a learning programe
Attitude examples	Willingness to recognise and accept the pros and cons of different pedagogic approaches

Competence Area	B4: Teaching & Learning
Competence title	4.2 Digital learning environments
Competence description	Choose and configure the right digital tools for different learning situations
Knowledge examples	Knowing which tool to use when and for what purpose
Skills examples	Understanding the time learners require to deploy digital tools in a task and building time into the task so they can interpret the task, assess their options, choose a strategy and correct it if necessary
Attitude examples	Flexibility in considering different digital tools for different circumstances

Competence Area	B4: Teaching & Learning
Competence title	4.3 Guidance and support
Competence description	Actively looking for ways to help learners develop their capacities, choices and decision-making through appropriate digital guidance and support
Knowledge examples	Knowledge of human behaviour and performance; individual differences in ability, personality, and interests; learning and motivation
Skills examples	Considering the relative costs and benefits of potential actions to choose the most appropriate one collaboratively with the class members
Attitude examples	Openness to alternative life pathways for learners

Competence Area	B5: Empowering learners
Competence title	5.1 **Accessibility and inclusion**
Competence description	To ensure accessibility to learning and development resources and activities, for all VET learners, including those with complex needs
Knowledge examples	Understands learners' digital expectations, abilities, uses and misconceptions, as well as contextual, physical or cognitive constraints to their use of digital technologies
Skills examples	Able to consider and respond to potential accessibility issues when selecting, modifying or creating digital resources and seeks to provide alternative or compensatory tools or approaches
Attitude examples	Sensitive to different needs and capabilities of VET learners

Competence Area	B5: Empowering learners
Competence title	5.2 Actively engaging VET learners
Competence description	To use digital technologies to foster VET learners' active and creative engagement with a subject matter.
Knowledge examples	Knows how to use digital technologies within pedagogic strategies that foster transversal skills, deep thinking and creative expression
Skills examples	Uses a range of digital technologies to create a relevant, rich and effective digital learning environment, e.g. by addressing different sensory channels, learning styles and strategies
Attitude examples	Openness to new, real-world contexts, which involve VET learners themselves in hands-on activities

Competence Area	B5: Empowering learners
Competence title	5.3 Information and media literacy
Competence description	To incorporate development activities which require VET learners to articulate information needs and find information and resources
Knowledge examples	Knows how to find information and resources in digital environments; to organise, process, analyse and interpret information
Skills examples	Teach VET learners' how to find information, how to assess its reliability, how to compare and combine information from different sources
Attitude examples	Methodological attitude to information seeking

Competence Area	B5: Empowering learners
Competence title	5.4 Understanding and guiding VET learners' on-line lives
Competence description	To understand and keep up to date with the online behaviours of VET learners and support them in maximizing the benefits of digital technologies in their lives
Knowledge examples	Knows which social media re currently used by VET learners and under what circumstances
Skills examples	Guides VET learners in respecting behavioural norms, appropriately selecting communication strategies and channels, and being aware of cultural and social diversity in digital environments
Attitude examples	Willingness to explore new online trends and behaviours

Competence Area	B5: Empowering learners
Competence title	5.5 Digital content creation for empowerment
Competence description	To incorporate learning and development activities in VET work which require learners to express themselves through digital means, and to modify and create digital content in different formats.
Knowledge examples	Knows how to support VET learners to express themselves through digital means, and to modify and create digital content in different format
Skills examples	Implements development activities in which VET learners use digital technologies to express themselves and produce digital content, e.g. in the form of text, photos, other images, videos
Attitude examples	Boldness in using experimental and disruptive digital tools to empower VET learner

Competence Area	B5: Empowering learners
Competence title	5.6 Responsible use
Competence description	To take measures to ensure VET learners' physical, psychological and social wellbeing while using digital technologies. To empower VET learners to manage risks and use digital technologies safely and responsibly
Knowledge examples	Is aware of the main risks and risk-taking behaviours that affect VET learners' lives online
Skills examples	Develops and implements strategies to effectively prevent, identify and respond to digital behaviour that negatively affects VET learners'' health and wellbeing (e.g. trolling)
Attitude examples	Responsible attitude to the use of digital technologies

Competence Area	B5: Empowering learners
Competence title	5.7 Digital problem solving
Competence description	To incorporate learning and development activities which require VET learners' to identify and solve technical problems, or to transfer technological knowledge creatively to new situations
Knowledge examples	Knows how to to seek out different technological solutions to a problem, investigate their benefits and drawbacks and critically and creatively come up with a new solution or product
Skills examples	Can apply 'thinking-outside-the-box' approaches to working with digital technologies
Attitude examples	Open to new ways of solving problems

DOMAIN C – FLEXICOMP-SPECIFIC COMPETENCES

Competence Area	C6: Collaboration Intelligence
Competence title	6.1 Inter-personal competences
Competence description	Apply empathy, social responsibility and relationship-handling in teaching activities with vulnerable learners
Knowledge examples	Understand the advantages of recognising other people's emotions
Skills examples	Ability to step into someone else's shoes
Attitude examples	Realise the benefits of understanding how other people's emotions affect relationships

Competence Area	C6: Collaboration Intelligence
Competence title	6.2 Conflict management
Competence description	Ability to express ones' thoughts, feelings and beliefs without violating the rights of others
Knowledge examples	Being aware of and understanding the different behaviours that people can apply in social anxiety situations
Skills examples	Ability to assert one's rights while offering consideration for others.
Attitude examples	Take ownership of one's feelings and not blaming others. Recognise that people should not take responsibility for the behaviour of others or for situations which are beyond their control.

Competence Area	C6: Collaboration Intelligence
Competence title	6.3 Resilience building
Competence description	Ability to cope with and adapt to challenges and use active listening and inter-cultural awareness to help vulnerable learners overcome barriers
Knowledge examples	Knowledge of the various dimensions and elements of active listening and non-verbal communication
Skills examples	Pays attention to body language
Attitude examples	Non-judgemental and engaging attitude Listens openly, without judgement

Competence Area	C7: Unlocking potential
Competence title	7.1 Supporting employability and development
Competence description	Use digital tools to support learners' employment, entrepreneurship and personal development
Knowledge examples	Knows how to develop learners' financial digital skills to support their future self-employment or freelance work.
Skills examples	Designs a class activity in which students search databases to identify job placements
Attitude examples	Willingness to work with external stakeholders such as local businesses

Competence Area	C7: Unlocking potential
Competence title	7.2 Subject and Industry- specific teaching
Competence description	Use digital tools to identify and take advantage of new practices and opportunities in relevant VET sectors, industries and fields
Knowledge examples	Knows how to use digital technology to keep updated in industry-related field.
Skills examples	Plan and develop a sequence of understandable instructions to solve a given subject/industry-related problem or perform a specific subject/industry-related task
Attitude examples	Open-ness to learn about developments in relevant industries

Competence Area	C8: Promoting creativity
Competence title	8.1 Working with hidden talent
Competence description	Use digital tools to surface and valorise the talents of disadvantaged learners and explore radical and emancipatory ways of changing their situation
Knowledge examples	Knowledge of principles of participatory / emancipatory / empowerment pedagogy
Skills examples	Application of empowerment theory and practice in setting a classroom assignment
Attitude examples	Knowledge of principles of participatory / emancipatory / empowerment pedagogy

Competence Area	C8: Promoting creativity
Competence title	8.2 Promoting creativity and out of the box thinking
Competence description	Designing and running activities that enable disadvantaged learners to solve problems in radical ways
Knowledge examples	Demonstrates an understanding of factors that support and block creativity
Skills examples	Uses collaborative learning environment to support students to creatively solve a problem together
Attitude examples	Courage to explore radical and disruptive approaches

5. Pedagogic Approach

This final section draws together the results of the state of the art review and lifeworld analysis to develop the FLEXICOMP pedagogic approach to the training programme – IO2. It begins by setting out the overall pedagogic approach and design principles. This is followed by a presentation of the pedagogic approach in more detail.

5.1 Overall approach and design principles

5.1.1 Applying the research findings to designing the pedagogic approach

The key findings of the state of the art review and lifeworld analysis reported on above in Section 3 have specific implications for the pedagogic design of the FLEXICOMP training programme. They highlight:

- The main barriers and challenges to acquiring and using digital tools in education and training for both VET educators and learners

- The training needs of VET educators and learners

- The content areas that need to be covered in the training programme

- The particular educational and pedagogic needs of educators and disadvantaged learners

- The support services likely to be required in delivering the training programme.

The key findings are summarised in Table 6.

Table 6: Implications of the research for pedagogic design

VET educators	VET learners
Challenges Workload Access to adequate infrastructure and IT training and support Learners with low skills and motivation; learners with variable skills and motivation	**Challenges** Previous negative experience of formal education and training settings Poor access to infrastructure and tools Making digital training relevant and useful to life and aspirations Lack of awareness of training available Fear of failure
Training needs Core digital skills Engaging learners Provide learners with personalized learning opportunities Understanding functionalities of different tools Support learners in their vocational life Understand 'techno-pedagogy'	**Training needs** Core digital skills Training for employment and personal development Understanding which tools for which purposes
Content areas Holistic and multi-disciplinary Combines core skills content with VET and industry-specific content Aligned with the FLEXICOMP competence framework Needs to keep pace with developments – in digital technology, VET and industry	**Content areas** Provides training in core digital skills, combined with industry-oriented training, including access to work placements and experience Needs to keep pace with developments – in digital technology, VET and industry

VET educators	VET learners
Large range of specific competences identified	
Pedagogic needs Hybrid environments delivering 'blended' training (on-line and face to face) Flexible training enabling adaptation and personalisation Collaborative learning and interactivity Supporting experimentation and problem-solving Adapting teaching to students with disabilities, specific education needs and variable abilities	**Pedagogic needs** Scaffolded learning adapted to the learners' own pace Flexible training enabling adaptation and personalisation Learning by doing – work experience
Support needs Organisational flexibility IT support Mentoring Peer support Review and feedback support External	**Support needs** IT support Mentoring for soft skills development Motivational support

The pedagogic design principles that stem from these key findings are as follows:

- VET educators' workload pressures imply the need for a training programme that provides a comprehensive spread of training areas whilst minimising the time trainees are required to put into participating in the programme

- Educators and learners also face financial constraints on training – these include the 'opportunity costs' of participating in training. Training should therefore be without personal cost to participants and should use free, open source tools and applications as much as possible

- Uneven access to digital infrastructure and tools for both educators and learners suggests the training programme should capitalise on existing and routinely used devices and tools whilst providing access to more innovative systems and tools where possible

- VET learners – particularly those who are disadvantaged and vulnerable – often have a negative previous experience of formal education and find it difficult to flourish in a conventional teaching environment. This supports the need for a flexible learning environment in FLEXICOMP that reduces barriers between teacher and students, increases the range of educational modalities and spaces to work in and and increases both teacher-student and student-student interactivity.

- Such an environment would need to support a 'scaffolded' pedagogy – for both educators and learners – that enables adaptation to learning profiles, circumstances and 'styles'.

- The evidence supports the development of a holistic and multi-disciplinary, training programme combining technical skills, social skills, interpersonal skills and skills specifically oriented to the needs of disadvantaged and vulnerable learners

- There needs to be an emphasis in the training programme on supporting VET educators to help adult learners prepare for integration with the labour market

- The training needs to keep pace with ongoing developments – in digital technology, VET and industry

- The programme should support VET educators to provide learning content involving the use of digital tools that reflect learners' lifestyles and lived experience, their aspirations and their experiences of education

- The training programme should put particular emphasis on equipping VET educators with the skills to deliver flexible learning to learners, so as to support student-teacher and student-student collaboration, interactivity, creativity and problem-solving

- Although the FLEXICOMP approach is predicated on self-directed educator training delivered on-line, there is strong evidence that this needs to be supported as far as possible with face-to-face training

- Support services need to be embedded in the FLEXICOMP training programme pedagogy. On the one hand, VET educators need to be provided with training to enable them to support disadvantaged and vulnerable learners in overcoming things like lack of trust in the system, low self-esteem and lack of motivation, as well as to acquire skills to deal with classroom disruptive behaviour. On the other, VET educators need themselves to be supported in their learning through support services delivered through the FLEXICOMP training programme that cover IT support, organisational support, networking with external industry actors, peer support and FLEXICOMP mentoring.

5.1.2 FLEXICOMP pedagogic model

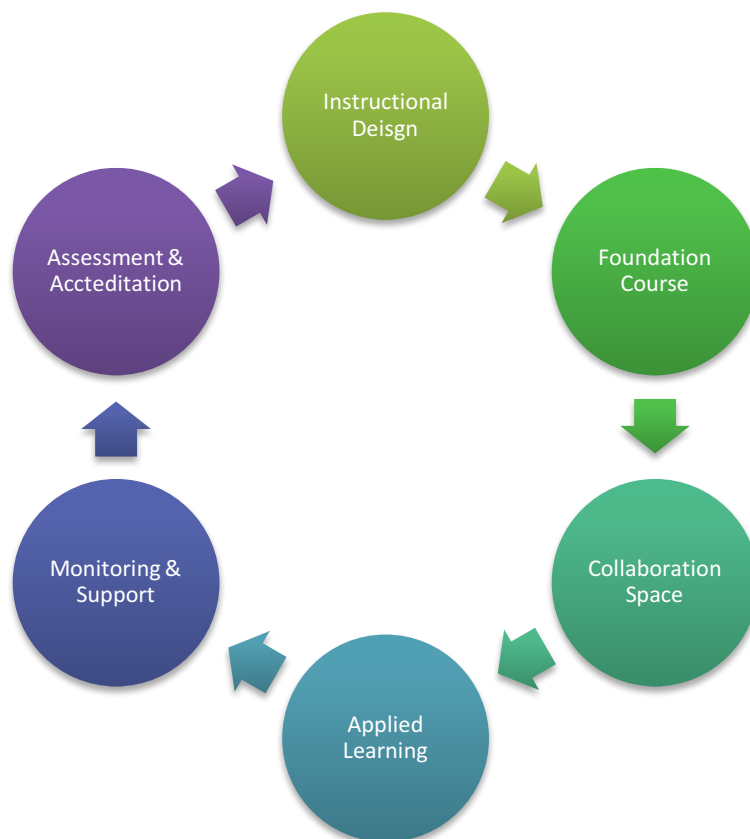Figure 9 applies these design principles to develop a pedagogic model to deliver the FLEXICOMP training programme.

Figure 9: FLEXICOMP Pedagogic Model

As Figure 9 shows, the FLEXICOMP pedagogic model incorporates six elements.

1. ***Instructional design.*** The starting point is the over-arching pedagogic approach adopted by FLEXICOMP, translated into instructional design principles. The main objective of the

pedagogic approach is to support VET educators to acquire the digital competences and practices they need to work with vulnerable VET learners so that these learners can in turn acquire the digital competences they need to improve their life chances and increase their social inclusion. At the core of the approach is a blended learning methodology that combines self-directed on-line learning with face to face interactive workshops, peer collaboration and learning-by-doing. It includes a 'scaffolded learning' method to enable course participants to learn at their own pace, according to their 'zone of proximal development'. Experiential learning tools are embedded into the instructional design, based on group work, peer exchange of experiences and know-how, case studies analysis and problem-solving, review and reflection.

2. ***FLEXICOMP Foundation course.*** This is the core modular on-line course comprised of modules that link to the competence domains in the FLEXICOMP competence framework, i.e. A: Core Digital competences, B: Enabling Digital competences, C: FLEXICOMP-specific competences. The course material and delivery combines three types of material: micro-learning content; interactive games and podcasts. The micro-learning is primarily based on short video clips, supported where appropriate with text files, presentations (ppt), website links, open courseware, videocoference and on-line webinars. Some of these are 'core' (mandatory) modules and others elective (optional). Learners will work with a mentor to customise their learning programme based on the results of their initial competence assessment.

3. ***Collaboration space.*** This provides a collaborative learning space for learners and the FLEXICOMP training team to share comments, questions, feedback, upload content, using blog and other social media, the discussion forum and tools like Google forms and Edmondo.

4. ***Applied Learning.*** In this part of the programme, participants will be expected to i) carry out one Assignment, applying the learning from the programme to design a learning activity, related to their own practice ii) peer review another participant's Assignment iii) take part in an off-line Action Learning workshop, delivered by the Programme team. This allows re-formulation of presenting VET learning issues and re-working into improved VET practice. The Action Learning Sets will include 'role-play simulations' addressing key issues and problems VET educators face in engaging with particularly marginalised and 'hard to reach' learners. This involves working with peers to reflect on their routine – and entrenched – practices, and using evidence-based examples of innovation – including case studies – to stimulate new ways of doing things.

5. ***Monitoring and Support.*** Each programme participant will be assigned a mentor from the project team, who will be responsible for monitoring the learners progress providing on-line support as required, using e-mail, chat, and other appropriate communication media.

6. ***Assessment and accreditation.*** The monitoring and support process is linked to a continuous process of assessment and accreditation. At each milestone stage in the programme (completing a core module; completing an assignment) learning outcomes will be assessed using a combination of learner self-assessment and assessment carried out by the mentor, using ''situational knowledge-based' quizzes. Progression will be accredited through a 'micro-certification' system based on Mozilla badges - a set of proficiency badges representing the successful development of skills and competences via both the non-formal and formal learning pathways and through the use of the learning environment e.g. active engagement in online discussion forums. Final assessment and accreditation will be linked to relevant European VET accreditation initiatives, through EQUAVET alignment/EHFA accreditation.

5.2   Programme structure, content and delivery

The programme structure, content and delivery follows the pedagogic approach outlined above, in Section 5.1.2. Development of the FLEXICOMP training programme – IO2 – will cover the elements included in the pedagogic model, together with supporting documentation for participants and course design and delivery teams, i.e.:

- Programme Design and Delivery Handbook

- Programme Participant Handbook, including provisions for course signing on and support services offered

- FLEXICOMP Foundation Course – modularised online course covering the three FLEXICOMP competence domains, offered as a combination of mandatory and elective modules, comprised of micro-learning 'objects', podcasts and interactive games

- Collaboration space structure and management systems and procedures

- Applied learning procedures and content – assignments, peer review, action learning workshops

- Mentoring and support services description, procedures and management

- Assessment and accreditation – quizzes, assessment protocols and accreditation procedure.

The online course delivery platform will be designed and developed in the early phase of IO2. This work will focus on Open Source technologies - including Moodle - and will support access to the learning platform from different devices.

Each module of the Foundation programme will specify:

- The competence domain, area and competences covered

- General objectives

- Learning outcomes

- Module description

- Skills gained and what to do with them

- Activities carried out

- Assessment

- Accreditation.

The modules provided in the programme need to cover the range of themes and subjects highlighted by the research, as described above in Section 3.1.2. The three main content elements of the Foundation course are micro-training, game-based learning and podcasting.

Micro-training is a training method that consists in delivering knowledge to the learners through short video resources (3-5 minutes duration), supported by supplementary material where appropriate (e.g. text, on-line links, powerpoint). Each video resource aims to teach a single learning component [19] [20]. The learning can be put into practice by the users immediately in their day-to-day practice (just-in-time training). Micro-training is a particularly effective tool in the training of professionals who carry

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[19]   N. Geri, "The Resonance Factor: Probing the Impact of Video on Student Retention in Distance Learning", Interdisciplinary Journal of E-Learning and Learning Objects, Vol. 8, 2012. http://www.ijello.org/Volume8/IJELLOv8p001-013Geri0794.pdf.

[20]   https://www.panopto.com/blog/5-facts-you-can-use-to-make-the-case-for-video-in-your-learning-development-organization/.

out activities in contact with people (professions in the sectors of social health and welfare, education, and personal service activities).

Podcasting (production of training content in audio format) makes it possible to benefit from training resources also in mobility, and in multi-tasking mode. The use of micro-training and podcasting makes it possible to optimise training time, minimising the impact on the educator's work organisation and facilitating work-life balance, through quality content available 24 hours a day, both from desktop and mobile devices, also in response to the growing demand for mobile training.

Game-based learning is based on the concept of teaching through repetition, failure and the accomplishment of goals. Just as in video games the player starts off slowly and gains in skill until they're able to skilfully navigate the most difficult levels, game-based learning applies the same concept to teaching. Users navigate their way through the game toward a goal, choosing actions and experiencing the consequences of those actions. They actively learn and practice the right way to do things.[21]

The role of game-based learning in the FLEXICOMP course will be linked to assessment. At the end of each module/training unit users will be redirected to the online game that will present classroom challenge scenarios that users will have to solve by applying the appropriate behaviour or response.

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[21]   https://thelearningcounsel.com/article/why-game-based-learning.

ANNEX I: State of the Art Review – Items reviewed in detail

Journal Articles

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Coders Lab, https://www.nesst.org/coders-lab

Creating Possibilities for Integration of Young People on the Labour Market, https://tinyurl.com/srby5e8

Crescere in Digitale, www.crescereindigitale.it

Digital Champions for Community Success, https://digitalchampions.community/About-Us

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iDEA Inspiring Digital Enterprise Award, https://idea.org.uk/about

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