



## **A Certification Framework for managing digital skills according to DIGCOMP2.1**

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### **Abstract**

*This paper describes in detail a Certification System that outlines the rules, procedures and management for carrying out the certification of a specific subset of competencies of the DigComp 2.1 (the European Digital Competence Framework). It establishes specific requirements for the process used, tools of assessment, grading and certificate awarding procedures. The system is composed of a Framework that maps Competence Areas/Competences to digital-specific skills and describes how questions and answers for two complementary certification tests are derived. The system also contains a grading system for mapping the points gathered from the test to a DigComp certification level. The Proficiency Level is calculated for each Competence independently based on the results of both tests using a 'fair' algorithm. For each Competence, the set of skills that corresponds to the Proficiency Level certified is awarded. A case of applying the framework in a pilot that promotes learning of digital literacy through learning national cuisines and cultures is briefly presented. Seven Competencies from Competence Areas 1,2 and 3 of DigComp 2.1 are used in this pilot and trainees are tested by a set of 86 pilot-specific questions.*

**Keywords:** *digital competence development , evaluation, certification system, DigComp 2.1;*

### **Introduction**

The frequent use of ICTs in work and in our lives increases the need to develop the appropriate set of competencies such as processing complex information, problem-solving, communication etc in order to seize the possibilities of effective ICT usage [1]. Along with that, the Organisation for Economic Cooperation and Development (OECD) consider that there was the demand of development for effective strategies for getting skills right including digital literacy that helps countries to measure their national digital skills [2]. So, the Joint Research Centre (JRC), a centre that support EU policies, developed in 2013 a user guide with a set of recommended digital competences that someone needs and helps stakeholders to measure the level of digital competence in the common framework named DigComp [3]. This tool could be used as self-evaluation form in digital competences or a framework to set learning goals in ICT training opportunities. Also, it offers a reference that stakeholders could be used to plan, design, evaluate and certificate via (using) education and training offers [4]. After that, two updating versions were published in 2016 and 2018. The differences concern updates in vocabulary, enrichment descriptors and examples of uses in all dimensions that can be used for instructional planning for education, training, assessment, and certification. This paper aims to describe the development of a certification system for Digital Competences (LinguaCuisine Certification System v.1.2) which participants develop in one project called The LinguaCuisine project. Many of the needs of LinguaCuisine project addressed are improving basic digital skills, specifically digital Competence, engaging digitally marginalized groups (including refugees and migrants) with technology and certifying and assessing levels of digital Competence. The LinguaCuisine Certification System v.1.2 (LCCS) outlines the rules, procedures and management for carrying out a certification of a specific subset of competencies of the DigComp 2.1 framework. The certification system's perspective is the establishment of a new certification system adapted in the guidelines of DigComp. In detail, this paper has derived in following sections: In the first section we mention the DigComp 2.1 framework, in the second section we describe the context of the LinguaCuisine Certification System v.1.2 that was used and in the third section outline the structure of this certification system.

### **DigComp and LCCF**

The Digital Competence Framework for Citizens (DigComp Version 2.1) [5] has 5 dimensions: 1) Competence Areas (CA) identified to be part of digital Competence 2) Competence descriptors and



titles that are pertinent to each area 3) Proficiency levels for each Competence with eight Proficiency Levels for each Competence have been defined through learning outcomes (using action verbs, following Bloom's taxonomy) :

Level 1: Foundation- Simple Tasks performed with help

Level 2: Foundation- Simple Tasks performed with autonomy and guidance when necessary

Level 3: Intermediate- Well defined, routine tasks

Level 4: Intermediate- Well defined, non-routine tasks

Level 5: Advanced- Different tasks and problems

Level 6: Advanced- Most appropriate tasks

Level 7: Highly Specialised: Complex problems

Level 8: Highly Specialised: Complex problems with many interacting factors

4) Knowledge, skills and attitudes applicable to each Competence and 5) Examples of use, on the applicability of the Competence to different purposes. The current version of the LCCS certifies digital and specific skills derived from the subset of Digcomp 2.1 (the orange background color of cells in Table 1)

### **Structure of the Certification System**

The Certification System is comprised of the following parts: a) LinguaCuisine Conceptualization Framework (LCCF), b) Certification tools c) Grading Methodology and d) Certificate Skills award.

#### **a) LinguaCuisine Conceptualization Framework (LCCF)**

The framework uses the 5 dimensions of DigComp v2.1 and a subset of Competence Areas to provide a mapping of the competences, the generic digital skills, LinguaCuisine-specific examples of use and questions/answers for the two tests used for certification. It is used to derive appropriate certification questions that cover all basic skills at all levels. Scoring functionality is used to calculate the score of the certification and assign a trainee to a PL for each Competence under examination. The design of the certification tools requires in turn the design of questions that assess the skills of every Competence Area and Competence included in the LCCF. Digital skills can be either generic or related to the use of LinguaCuisine applications or methods. Both categories of skills need to be mapped to the specific competences of DigComp. There is a one to many (1-N) relationships between a Competence and skills. Moreover, skills are Proficiency Level – specific, that is, a skill is mapped not only to a Competence but also to a specific Proficiency Level as well. These skills are called PL-Skills (Proficiency Level Skills). The Examples of use, along with the PL-Skills are used to derive questions and answers for the certification tools. The skills are described using the specific terms of each Competence and PL, having in mind the goals of each Competence. Terms such as “identify”, “find”, “explain” and others that appear in the descriptors of a Competence in DigComp 2.1 are used to describe the skills and then to derive the examples of use (Table 2). High Level skills (HL-skills) are internal to the design process of the LCCF. Questions conceptually group the assessment of skills from different PLs based on the semantic resemblance of the descriptors that correspond to each PL. Semantic resemblance is expressed in the descriptors when the same clause is used for performing tasks and the only difference is the type of the action, e.g. ‘identify’ for PLs 1 and, ‘explain’ for PL 3 and ‘illustrate’ for PL 4. Moreover, HL-skills used for the design of Test II questions where the trainee must be given a specific task in a specific context (scenario) to perform and be rated by the trainer. Specific scenarios define, in a concrete way, the goals to be achieved and at the same time allow the trainee to focus on what is assessed and not in secondary tasks that are not under assessment.

#### **b) Certification Tools**

The certification tools include two tests of different type, Test I and Test II. They are designed to assess the PL of a Trainee both by way of a certification test (Test I- a multiple choose quiz of 49 questions) and by observation and rating by a tutor (Test II- observation sheet including 37 assessment tasks). As concern TEST I, each competence is generally assessed by the same number of questions. A minimum of 4 questions and a maximum of 8 questions per Competence are used and there are six (6) possible answers in each question: four options correspond to the four PLs and two options to false answers. In TEST II, a question gives exactly four choices to the trainer. One of the choices is standard and corresponds to Proficiency Level 1 behavior: ‘Can do with assistance’. The other three choices depend on the Competence and skills under assessment. Test II is designed to assess each Competence using 5-8 questions.



**c) Grading Methodology**

It provides the scoring ranges and algorithms for calculating the total score for each Competence assessed by the certification tools. The scoring strategy assigns a numeric score to a Competence, but this must be transformed into a grade on some scale so as to derive a decision about the Proficiency Level.

The basic idea behind this transformation is that a threshold of more than 50% of the maximum score (>50%) of a Proficiency Level must be obtained for the Competence to be assigned at that level. The maximum score of a Proficiency Level *i* in a set of *k* questions assigned to a Competence is calculated by the product:

$$MaxScore(i) = k * i, \text{ with } i=1,2,3,4$$

This result is easily calculated since an answer that corresponds to Proficiency Level *i* is awarded with a score of *i* points. Both tests use the same scoring method and they are designed to complement each other.

**d) Certificate Skills award.**

The Certification System awards certificates based on the Proficiency Level that was calculated for each Competence. Thus, each time a trainee is certified for a Competence, a specific set of generic and LinguaCuisine-specific skills award is produced.

Competence Areas (CA)	DigComp Competencies	Proficiency Levels	Developing Competencies	Examples of Use
Information and data literacy	1.1 Browsing, searching, filtering data, information and digital content		Knowledge, skills and attitudes that apply to each Competence	Examples of Use ↓ LinguaCuisine-specific examples of use
	1.2 Evaluating data, information and digital content			
	1.3 Managing data, information and digital content			
Communication and collaboration	2.1 Interacting through digital technologies			
	2.2 Sharing through digital technologies			
	2.3 Engaging in citizenship through digital technologies			
	2.4 Collaborating through digital technologies			
	2.5 Netiquette			
Digital content creation	2.6 Managing digital identity			
	3.1 Developing digital content			
	3.2 Integrating and re-elaborating digital content			
Safety	3.3 Copyright and licences			
	3.4 Programming			
	4.1 Protecting devices			
	4.2 Protecting personal data and privacy			
Problem solving	4.3 Protecting health and well-being			
	4.4 Protecting the environment			
	5.1 Solving technical problems			
	5.2 Identifying needs and technological responses			
	5.3 Creatively using digital technologies			
	5.4 Identifying digital competence gaps			

Table 1: The DigComp framework and the LCCF

Competence Areas

Competence 2: Interaction through technologies

Competences

Corresponds to different PL skills

3.4.4 Interacting through digital technologies (2.1)

Descriptors (DIGCOMP)	Skills	Related Questions	Answers [Score]
<ul style="list-style-type: none"> <li>To be able to select simple digital technologies to interact (1&amp;2)</li> </ul>	<ul style="list-style-type: none"> <li>Can distinguish between synchronous and asynchronous communication media and choose between them the most appropriate to the communication I want exchange.</li> <li>Is aware of different digital communication means (e.g. email, chat, VoIP, video-conference, SMS)</li> <li>Knows how messages and emails are stored and displayed</li> <li>Understands the services offered by social media tools</li> <li>Understands privacy and safety risks associated with the use of digital content</li> <li>Able to find relevant communities, networks, and social media that correspond to his/her interests and needs</li> </ul>	<p>A.23 You have met a group of people that share the same passion as you for cooking but it is difficult to meet them face-to-face to exchange recipes and cooking tips. You...</p> <p>A.24 You are trying to set-up regular meetings with your on-line cooking group of friends. How do you organize these meetings?</p>	<p>1. chat with them on line with the help of a friend [1]</p> <p>2. exchange recipes by email [1]</p> <p>3. chat about cooking tips in Facebook [2]</p> <p>4. make Skype call to each of one of them separately [3]</p> <p>5. organize regular Skype group meetings [4]</p> <p>6. call them on the cell from time to time and talk about the recipes [0]</p> <p>1. I call every member of the group and ask him/her about his/her availability [0]</p> <p>2. I organise their addresses in a contact list and I group-email them the details [2]</p> <p>3. I use a doodle with possible meeting dates for the meetings [3]</p> <p>4. I set up a group in my email app and set-up automatic reminders for the meeting at the calendar [4]</p> <p>5. I email each one with the details of the meeting but I need help to contact all of them [1]</p> <p>6. I access the recipe builder and post a message at the forum [0]</p>

Generic digital skills

LinguaCuisine-specific examples of use

False answer

Table 2: A Case of the mapping skills to competences and to Proficiency Levels (PL) in TEST I

## Conclusions

The certification system has been designed so that it can be applied to assess LinguaCuisine trainees. However, the framework could be used to map Competences to general skills and extract examples of use that will, in turn, produce tests that are appropriate for a variety of scenarios. So, it is extendable since more Competence Areas and Competences can be added and therefore the appropriate generic skills can be derived and mapped to them. The context can also be changed and Examples of Use can be designed to fit new requirements.

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