Boosting Classes 2.0 for high-quality teaching in adult education

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IO1- Framework to integrate new technologies in adult education through project-based learning

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INTRODUCTION

The project intends to promote and implement effectively the integration of new technologies in education combined with appropriate learning and teaching approaches established as good practices in the more experienced partner countries. This will allow designing open education resources to be delivered through different devices on the base of the principles of "BYOD" (bring your own device), requiring specific methodological skills (e.g. project-based learning).

Digital competencies are increasingly seen nowadays as an essential fundament for citizenship. Since digital technology and related services are continuously changing, digital competence needs to be updated accordingly to reduce digital exclusion risks. Indeed, this risk of exclusion is increasingly connected to the lack of competence, while access to digital tools is continuously increasing. For example, mobile phone use, which in 2019 has reached coverage of 100% in all continents except for Africa, has a penetration rate of 80% (ITU Statistics, 2019). At the same time, digital competencies have become crucial for employability and in the workplace.

In a world permeated by media messages, designing training means dealing with multiple media that simultaneously represent vehicles of information and specific study objects characterised by their languages and cultures. The subjects involved in media education cannot ignore specific training planning skills and specific media education skills.

Based on the results achieved by previous European and national initiatives, the project proposal intends to be further developed in the designing of a new curriculum and didactic open resources for the promotion of Classes 2.0 in adult education. The use of technology can increase learners' learning motivation and flexibility in assessment and evaluation system in distance learning. Moreover, it can let learners progress towards higher qualifications through individual learning needs' identification for better-personalised learning paths.

Therefore, as a starting point for analysing, comparing and discussing different tools for developing educators' digital competence, a common language should be defined. For this reason, the premises should be identified in the three concepts: media education, multimodality and adult education.

First of all, media education, a discipline between the educational sciences and pedagogy, in which the word "education" stands for the actions aiming to form citizens in all aspects by reinforcing the emotional and pleasure processes of learners by enhancing their subjectivity. However, this can be heavily conditioned by economic and ideological factors.

Secondly, multimodality meant using different languages and expressive digital forms to activate effective communication strategies through words, sounds, images, animations.

Finally, "adult education" meant as a set of activities aiming at an adult audience's cultural and professional education by enhancing participatory, active and constructive citizenship. In this direction, training connected

to adult education is addressed to increase people's awareness according to their social role and responsibility bounded to their work, individual and social fields.

Starting from these premises, it is crucial to identify a common framework for identifying teaching and learning approach, promoting and implementing the integration of new technologies in adult education effectively. This can take place by encouraging modern concepts in education and a healthy working environment and teamwork, creating developing programs attractive to adults, allowing them continuous shaping throughout their lives.

Consequently, the report will discuss and describe as follows:

- the results coming from the analysis and the comparison of the teaching and learning approaches for the use of technology in the classes in adult education also applied in partner countries (Italy, Bulgaria, Romania and Spain);
- mapping of the digital skills identified for the integration of the technology into the classes for adult education also in partner countries (Italy, Bulgaria, Romania and Spain);
- the results coming from the analysis and the comparison of the assessment and evaluation systems in the distance learning through the specific tools and techniques also in partner countries;
- the current trends in the use of technology into the classes for adult education;
- the project-based learning framework identified for building Classes 2.0 in adult education.

1. ANALYSING AND COMPARING THE TEACHING AND LEARNING APPROACHES

The selection of a specified teaching and learning approach to use in the class results from educational design, including context knowledge, the learning objectives and their own practical experience on the field. Actually, to successfully achieve the learning objectives, the theoretical knowledge of pedagogy should always be combined with their own empirical experiences.

Designing media education paths at the local level means having a double heterogeneity combining the context features and the specific educational activities' contents with being developed.

Media education (meant as a set of educational contents, including media objects) is flexible and heterogeneous regarding both the media tools used and the different possible objectives and the multiple activities for reaching them.

Thus, if, on the one hand, a strict method to plan is necessary, on the other hand, sharing the educational objectives to be achieved, the planning, the learning process management and the eventual factors which can affect them are essential as well.

This means that media education activities, in or out of a school context, have to contain both media components (represented as a part of media equipment) and educational elements (addressed to specific educational objectives identified accordingly to the users' features).

The teaching activity can be a classroom in presence, open distance learning or blended.

In this context, the expression "open distance learning" (ODL) intends any learning activities within formal, informal, and non-formal domains that are facilitated by information and communication technologies to lessen distance, both physically and psychologically, and to increase interactivity and communication among learners, learning sources and facilitators (Bozkurt A., 2019). In contrast, "blended learning" refers to the teaching-learning activities integrating both face-to-face and distance ones.

Other teaching activities are recognised as an online course (access already e-learning material via a platform by the learner), virtual group (collaborative activity among students, organised by their teachers), virtual community.

Facilitators of the learning process can support all the activities as teachers or tutors.

According to the typology of activities, three main reference learning paradigms can be distinguished:

- rationalist-informationist (based on contents including advanced forms of formative assessment);
- systemic-interactionist (learning by discovery, interactive game, simulation environments);
- social constructivist (exchanges between learners and supporting figures, collaborative work).

1.1 Educational activities planning

The educational activity planning[1] is focused less on the predetermination of the process' single steps in chronological sequence progression and more on a strategy integrating planning, implementation, management, monitoring, evaluation.

Educational planning involves two main areas. The first one concerns socio-educational paths aimed at favouring the solution of social relevant problems, with possible removal of natural or psychological constraints or limits existing in the context in which the specific learners live. The second one concerns teaching projects regarding school, business, lifelong education, addressed to encourage changes in the learners' knowledge and skills and in their ability to put them into practice (Antonio Calvani, 2016).

Using the definition of Antonio Calvani, the teaching design is a type of educational planning addressed, directly or indirectly, to achieve learning objectives suitable for learners (Antonio Calvani, 2016).

Therefore, "designing" includes many actions requiring different skills. For this reason, the identification of guiding models, which can support educators in the development of effective projects, can be beneficial.

Besides formal education, out-of-school contexts contribute to non-formal learning by supporting the individuals' real growth through the horizontal skills' development (such as communication, social and collaboration skills, etc.) against a more formal and codified knowledge acquired at school.

This favours the establishment of new relations between teachers and students who share a process for building a meaningful learning path and not only a simple transmission of knowledge from teachers to students.

Therefore, "educational design" should aim at creating favourite conditions to develop meaningful learning experience to ensure effective learning by affecting learners' both professional and social life further than their self-development. Otherwise, in a learning context that is addressed only to formal education, two main risks are identified by Cristina Palmieri (Palmieri C.,2016). The first risk is the "self-referentiality" of a formal context that cannot valorise the learners' differences, regarding both themselves and their social background, by interrupting the continuity between the living and educational environment.

The second one is to deny the actual value of education. Due to current social emergencies, it seems it has to be oriented only to the care, therapeutic and keeper tasks.

[1] Linear design involves phases proposed in succession in a single process where the design is the *ex ante* moment with respect to the didactic action and has the function of anticipating the process to be carried out: A.D.D.I.E. that is Analisys - Design - Development - Implementation - Evaluation. The A.D.D.I.E model is a rigid model, based on the behaviorist paradigm (incentive-response) while today society has profoundly changed and changes quickly because the inputs from the labour world are constantly updated, people go from knowing how to do to knowing how to act. Competence is the ability to mobilize internal and external resources in order to solve the task that is complex and unpredictable today (Almomen, R. K. & alii, 2016).

Theory and practice are bonded by the fact that any educational activity includes a choice that will be guided by theoretical reflection and the training implementation, which can offer a re-formulation of the theoretical presuppositions underlying (Vanna Iori, 2018).

Therefore, the reflective practice should adapt the techniques and methods to each learning situation's specific features where technique becomes a means and not an end.

The starting idea of an educational action should be subject to a feasibility check and came from specific training needs, meant as a set of revealed problems, referred to specific target groups.

In the case of a multimedia educational project, the initiative should be paid attention to the context in which it is carried out. If it takes place in a school context as a part of the curriculum, it will have different features from the same project implemented, for example, in a youth centre.

Among the tools to be used for analysing media education needs can be identified as follows:

- interviews (individual or group), addressed to users, privileged witnesses or multimedia educators with experience in the same field;
- questionnaires generally used with the project beneficiaries;
- direct observations, more or less structured, of the target group's behaviour.

The educational design is not only aimed at drawing up a planning document, but it implies knowing how to select the most suitable learning action adapted to the given context according to the tools and opportunities available. Multimedia education in the school environment is usually assigned to a teachers' team by supporting a multidisciplinary approach.

In this context, the teacher's function, as the facilitator of the learning process, is centred mainly in the class. Teachers provide students with technical and pedagogical support to organise and develop the topics and activities by maintaining a positive climate of the group-class to promote socialisation.

In this way, teachers' can explore the potentiality associated with the use of computers and educational software in an open system designed to develop students' creativity.

1.2 Extra-curricular teaching activities

Besides the formal school activities, extra-curricular tasks are widely recognised as relevant in the students' development.

Extracurricular teaching indicates all teaching approaches intended to create learning according to different objectives, methods and contents.

Cosimo Laneve (Lavene C., 2011) identifies the extracurricular teaching features as follows:

- it organises the learning path around general skills rather than specific areas of knowledge;
- it includes different teaching approaches (e.g. master, advanced courses, third age universities addressed to adults);

- it designs programs that include socially shared intellectual work and which are organised around a common accomplishment of tasks;
- it usually favours horizontal relationships (based on work and concrete situations) rather than vertical ones (based on the teacher's authority), presenting a variety of real examples;
- it includes features of apprenticeship;
- it focuses on the perception of the meaningful experiences-activities that are crucial for training outcomes;
- it does not have a recurring character.

The following objectives of the extracurricular teaching are identified according to the Author (Lavene C., 2011:

Table 1: Objectives of extracurricular teaching

Cognitive level	– arousing curiosity, novelty; – promoting creative and exploratory experiences; – developing a relationship between doing and thinking, students don't learn a specific answer but think about new solutions.
Affective - expressive Level	– improving aesthetic sensitivity; – promoting expressive experiences like the ability to express oneself; – expressing sensations, feelings, emotions, impressions.
Social Level	– encouraging spontaneous and immediate socialisation – promoting "experiences" ensuring relational and interactive opportunities – favouring interpersonal communication, discussion, collaboration, participation, team-work
Physical-bodily level	– satisfying the needs for movement and play

The contents of extracurricular teaching must promote curiosity, interests, experiences; be multidisciplinary, represent multiple cultures present in the environment; possess new computer and mass-media language codes.

A model to be considered is Kerr's map (Figure 1), where all the elements are interconnected, interacting among them towards a continuous development:

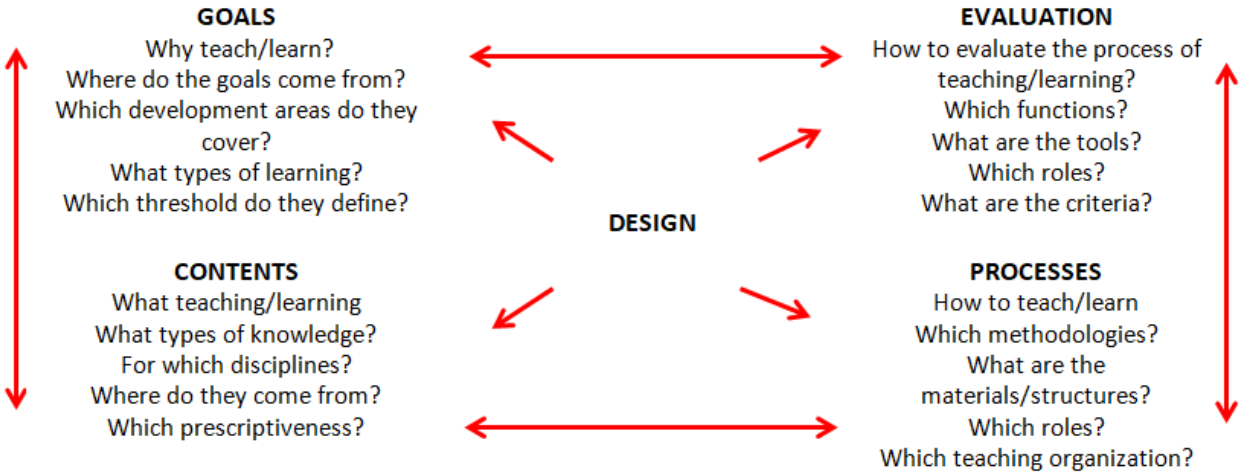


Figure 1: Curriculum design model following Kerr's map.

According to the model (Figure 1), four different areas are connected among them, which are contained in an educational design.

The first concerns the learning **goals** of the training proposal or the expected results. This is the answer to the question: "why teach/learn?". They can be indicated differently, such as goals, aims, objectives, performances and standards according to the specificity level through which they are described.

However, the learning goals should be revised in terms of competences to be acquired.

The **training contents**, meant as "what to teach/learn?", regard the knowledge to be developed concerning the goals previously fixed. Since there is a close integration between learning goals and contents, it is crucial to identify the intersections between key competences and disciplinary knowledge (know-that - declarative and know-how - procedural).

The **processes** concern the learning actions to be realised to reach the goals and the contents identified. This responds to the question "how to teach/learn?", that it refers to the identification of the teaching approaches and solutions that are more suitable for the goals set

Finally,

Finally, the model refers to the **evaluation** of the expected results in the learning process by responding to the question "how to evaluate the teaching/learning process?". This is an essential part aiming to verify the effective achievement of the learning goals and the overall effectiveness of the whole action. It should be identified already during the designing.

Moreover, an element characterising a learning project is the **problem-situation** on which the teaching action is structured.

If the competence tends to highlight the learning project goals, which are "the reason" of the action itself, the situation-problem defines "what" must be addressed and solved.

In this context, (i) students are expected to deal with the constraints fixed; (ii) the solution is often realised with the creation of a product and, therefore, they become active; (iii) they need integrating multiple resources (both internal and external); (iv) the inputs/information provided by the teacher combine with the ones comes from other learning contexts, for example from personal sphere.

1.3 Definition of competence and its assessment

A competency is the capability to apply or use a set of related knowledge, skills, and abilities required to successfully perform "critical work functions" or tasks in a defined work setting (ISO 10015:1999).

Competencies define the applied skills and knowledge that enable people to perform their work successfully. They are different from the learning objectives, which are strictly related to a course of instruction. Competencies are relevant to an individual's job responsibilities, roles and capabilities. They are a way to verify that a learner has learned what was intended in the learning objectives. Learning objectives describe what the learner should be able to achieve at the end of a learning period. In short, objectives describe what teachers/educators want the learners to know, and competencies indicate how teachers/educators can be sure they know it.

In this framework, the assessment of the competencies is a relevant part of the learning process. Students tackle tasks or complex and open problems to demonstrate their mastery of what they are doing or know. This requires a deeper understanding, knowledge, active processing in a specific context, the use of their resources affecting learners' cognitive, emotional, and social dimension.

One fundamental aspect of competence' assessment is that they should be authentic.

An authentic assignment requires applying what students have learned to a new situation, and that demands judgment to determine what information and skills are relevant and how they should be used. Authentic assignments often focus on messy, complex real-world situations and their accompanying constraints.

"...Engaging and worthy problems or questions of importance, in which students must use knowledge to fashion performances effectively and creatively. The tasks are either replica of or analogous to the kinds of problems faced by adult citizens and consumers or professionals in the field." -- Grant Wiggins -- (Wiggins, 1993, p. 229).

According to Grant Wiggins (1998), an assignment is authentic if it:

- is realistic.
- requires judgment and innovation.
- asks the student to "do" the subject.
- replicates or simulates the contexts in which adults are "tested" in the workplace or civic or personal life.

- assesses the student's ability to efficiently and effectively use a repertoire of knowledge and skills to negotiate a complex task.
- allows appropriate opportunities to rehearse, practice, consult resources, and get feedback on and refine performances and products.

Some examples of the authentic assessment are as follows: research and investigation tasks; expression and creative production; preparation of a communication or a report on a specific topic to be presented to the class; the development or selection of tools for data collection and processing; creation of an audio-visual product; preparation of an awareness campaign and decision-makers tasks.

The authentic assessment encourages students to face real tasks or tests by identifying methods, procedures, languages, and times. It activates conscious processes of self-assessment of their work, and, in case of error, it provides them with the ability to revise the procedures implemented.

The authentic tasks refer to the real contexts (direct or simulated), increase students' interest in challenging situations, stimulate complex cognitive processes by going beyond the single disciplines' limits, and analysing possible solutions.

Therefore, the construction of authentic tasks includes identifying the competences' goals, as desired results, and the tasks; the integration with traditional methodologies; the planning of the learning experiences on the base of the achievement of the expected results.

The table below, drawn from Wiggins (Wiggins G., 1998), illustrates the differences between typical school tests and authentic assessments.

Table 2: Differences between school texts and authentic assessments.

Typical tests	Authentic tasks	Indicators of authenticity
Require correct responses	Require a high-quality product or performance and a justification of the solutions to problems encountered	Correctness is not the only criterion; students must be able to justify their answers.
Must be unknown to the student in advance to be valid	Should be known in advance to students as much as possible	The tasks and standards for judgment should be known or predictable.
Are disconnected from real-world contexts and constraints	Are tied to real-world contexts and constraints; require the student to "do" the subject.	The context and constraints of the task are like those encountered by practitioners in the discipline.
Contain items that isolate particular skills or facts	Are integrated challenges in which a range of skills and knowledge must be used in coordination	The task is multifaceted and complex, even if there is a right answer.
Include easily scored items	Involve complex tasks for which there may be no right answer and that may not be easily scored	The validity of the assessment is not sacrificed in favour of reliable scoring.
Are "one-shot"; students get one chance to show their learning	Are iterative; contain recurring tasks	Students may use particular knowledge or skills in several different ways or contexts.
Provide a score	Provide usable diagnostic information about students' skills and knowledge	The assessment is designed to improve future performance, and students are important "consumers" of such information.

To construct an authentic task, the features identified by Comoglio (Comoglio M.,2002) will be considered as follows:

- applying fundamental concepts, principles and skills learned in new contexts;
- encouraging progressive development in learning;
- involving higher-level processes than the simple repetition of learned knowledge;
- favouring many solutions as possible;
- challenging;
- placing in a real context;
- requiring the development and reconstruction of learned knowledge;
- part of the learning process;
- integrating knowledge and skills;
- developing a greater understanding of concepts and principles;
- providing clear indications on what learners need to do;
- providing clear indications on how the learning process should be followed;
- suitable for the knowledge and skills of the target group;
- good balance between the performance's accuracy as expected and its different possible alternatives;
- freedom from cultural or racial bias;
- feasibility concerning access information, sources or materials required;
- in line with the standards and objectives of the training;
- identifying criteria make its assessment possible.

To contextualise knowledge, teachers can use:

- **active teaching** mediators as practical experiences, field observations, experiments, manipulative activities directly linked to concrete experience;
- **iconic teaching** mediators as videos, photographs, drawings, but also diagrams and tables;
- **analogical teaching** mediators as simulations, role-playing, tasks related to "putting yourself in the shoes of", acting "as if" etc.;
- **symbolic teaching** mediators as the "markets" to teach the concepts of expenditure, income, revenue, net weight and gross.

An educational context can implement teaching based on competencies through teaching planning addressed to the skills development, including meaningful learning, personalised learning paths, multiple approaches application and authentic tasks carrying out.

A change in teaching is needed from teaching-centred strategies to learning-centred.

Therefore, teaching should be designed to promote situations in which students can construct their knowledge actively through learning contexts based on experience. This also includes a teaching/organisational renovation: from transmissive teaching (based on listening, explanation, repetition, exercise) to active education (e.g. creation of meaningful situations, use of internal and external resources, diversified approaches).

1.4 Teaching and learning approaches in adult education

In adult education, learners enter the teaching site with very different life and learning experiences; therefore, a good teaching strategy will entail differentiated plans. Many adults who come to the teaching site have strong resources in special fields and want to be visible and accepted because of their abilities. Good teaching activities will enhance the self-esteem of learners and use their large potential. Adult students want to see a clear connection between the learning process and a future life situation where they will be actors and enhance their value. Therefore, good practice in teaching situations will clarify the connection between formal learning activities and a future reality where students will act in.

E. C. Lindemans book, The Meaning of Adult Education (Ludvigsen S. & Alii, 2002), published for the first time in 1926, was the precursor for the modern view on adult education (Knowles M., 1984). Lindeman stresses that adult education must have the aim to improve the quality of life, and to provide "new meaning for life and new reasons for living". He states that all learning must be based on significant experiences from many different situations in life.

Lindeman stresses that the ultimate aim of all learning should be to master familiar and new situations: "*What is important is that the mind should be sensitive to problems and skilled in methods of attack and solution*" (Tough A., 1985).

M. S. Knowles bases his book *The Modern Practice of Adult Education* (Knowles M., 1984) on his own experience with teaching adults. In 1984, he systematises his ideas for adult education in the *book Andragogy in Action* (Tough A., 1985) and explains his position of adult education versus "ordinary" pedagogics in five points. A summary of these five points follows:

1. **Regarding the concept of the learner.** The adult learner is self-directing, one who has arrived at a self-concept of being responsible for her/his own life, of being self-directing.
2. **Regarding the role of the learner's experience**: The andragogical model assumes that adults enter into an educational activity with both a greater volume and a different quality of experience from youth. This difference in experience has several consequences for education; the adults are the richest resources for one another. There is more significant heterogeneity in groups of adults. Consequently, in adult education, greater emphasis is placed on individualised learning plans.

3. **Regarding readiness to learn**: The andragogical model assumes that adults become ready to learn when they experience a need to know something to perform more effectively in some aspect of their lives.
4. **Regarding orientation to learning**: Adults are motivated to learn after they experience a need in their life situation; they learn to solve a problem or live more satisfyingly. This attitude stresses organising learning experiences (the curriculum) around life situations rather than subject matter units.
5. **Regarding motivation to learn**: although adults will respond to some external motivators – a better job, salary increase, and the like – the andragogical model predicates that the more potent motivators are internal - self-esteem, a better quality of life, self-actualisation, and the like (Wie A. L. et alii, 2009).

Based on the above written, it is important to underline the differences between pedagogy and andragogy, between an educational setting for young people or adults. In fact, in both cases, the main aim is teaching. However, the young and the adults have different life experiences, needs, hopes, aims, and even their social and psychological maturity. And this is the main reason why the principles and methodology of didactics of the adults have to be different from young learners' method. In the following table, the pedagogy and andragogy will be compared to a better understanding:

Table 3: Differences between pedagogy and andragogy

PEDAGOGICS	ANDRAGOGICS
A teacher points out the aim of learning. A teacher works according to the standards of teaching and compulsory programme of education. He knows what the students must learn but the students do not if they ever think on that question. So, a teacher defines the aims and the objects.	**A learner himself determines the aim.** An adult learns because he has the aim, that is he has the real view of the present and the future context where his knowledge will be put into practice. All by himself or with the help of a teacher he foresees the objects and needs of learning and discusses the relation between the present and future situations: where am I now? Where do I want to go? What possibilities will the acquired knowledge give me and how is my life going to be changed because of the new situation?
Learners have no practical experience. Young people have no practical experience and often base their knowledge on the information they get. In this case the authority of a teacher is very significant.	**Learners have practical experience.** In the cause of active life and learning the three different processes are in progress future /planning/, present monitoring and the past. Adults have already got the acquired knowledge, only they add new and then compare and classify it. If needed he recalls and puts it into use. That is why the adults' teacher in the educational process must refer to the experience of the learners, their knowledge and work in that way that students could integrate the new knowledge.
Strictly determined teaching program. This is influenced by ready-made standards of school subjects and educational programs. These standards are based on the settled educational requirements of the society.	**Flexible educational program.** It is orientated towards the ability of a learner, the level of preparation, learning style, needs and personality.
Teaching methods. The methods of frontal teaching and individual tasks are applied.	**Mostly active teaching methods are used** such as group work, communication, projects, and discussions. A learner chooses subjects and teaching methods himself.
The educational environment is usually formal, unfriendly based on racing, evaluation and self-confidence is low.	**Safe, friendly educational environment** is based on confidence and favourable conditions /adults achieve knowledge more successfully when they feel no fear and suitable psychological, social and intellectual climate is organised/.
The applicability of the information will be tested in the future.	**The applicability of the information is tested at the present moment.**
The audience is more trustful.	**The audience is more critical**
Marks are the means of evaluation. A teacher is an estimator. If a low mark is given for knowledge it effects the motivation of a student to some special subject, besides, sometimes it becomes the reason for losing an interest for learning	**The type of evaluation can be chosen.** An adult has possibility to evaluate his development and results constantly. A teacher and a student may come to an agreement about the final evaluation of the full course: the teacher's evaluation; self – evaluation of the student using the tests; the evaluation of colleagues and experts.

The adults' education teaching principals are different from traditional education:

Individual differences

- Adults have their interest and needs;
- The intellectual and social level of the adults is different;
- It is a long time since adults left their school;

- The time for achieving results is different;
- Adults have their style of learning and acquiring knowledge.

Self-esteem

- Adults like to be noticed, evaluated and appreciated as individual personalities. The relationship between students and adults' teachers is based on symmetrical role relations, both working together in a learning process.

Responsibility

- Adults understand that learning demands efforts; sharing the information and experience, they are responsible for the results themselves;
- The learners must see the immediate connection between the teaching program and improvement of future knowledge, theory and practice.

Flexibility and sensitiveness

- Adults can change the aims and even their point of view in the process of education quite flexibly. Andragogy has to react to learners' needs, aims and even change the teaching material if necessary. Due to the adults' changing mood and conditions, teachers must change teaching strategies to hold learners' attention and interest.

1.5 An overview of teaching and learning approaches for the use of technologies in adult education in partners' countries (IT, BG, RO and ES)

An essential component of the services of a high-quality Adult Education program is the integration of digital literacy into curriculum and instruction. Providing opportunities for learners to explore, experiment, and develop expertise using real-world applications while building skills to prepare learners for success in our digitally-connected world.

Some benefits that come from digital literacy include:

- Extend ongoing and self-directed learning through a wealth of distance learning, online and other interactive multimedia that may accommodate a range of learning styles;
- Prepare for success in postsecondary education, training, and to compete for careers with a family-sustaining wage;
- Identify community resources, engage more fully in civic activities and participate in our democracy;
- Become part of an online learning community.

In the BoostClass 2.0 project framework, a survey was submitted in Italy, Bulgaria, Romania, and Spain to analyse in details which are the most used teaching and learning approaches for the use of technology in adult education in these partner countries. The results are described and discussed in the following paragraphs.

1.5.1 Italy

In Italy, the analysis was based on 29 answers processed by a slight prevalence of females (63% of respondents). Serving principally within a school system (88,9 %), respondents' professional experience both in education and in the adult field are summarised in Figure 2 below.

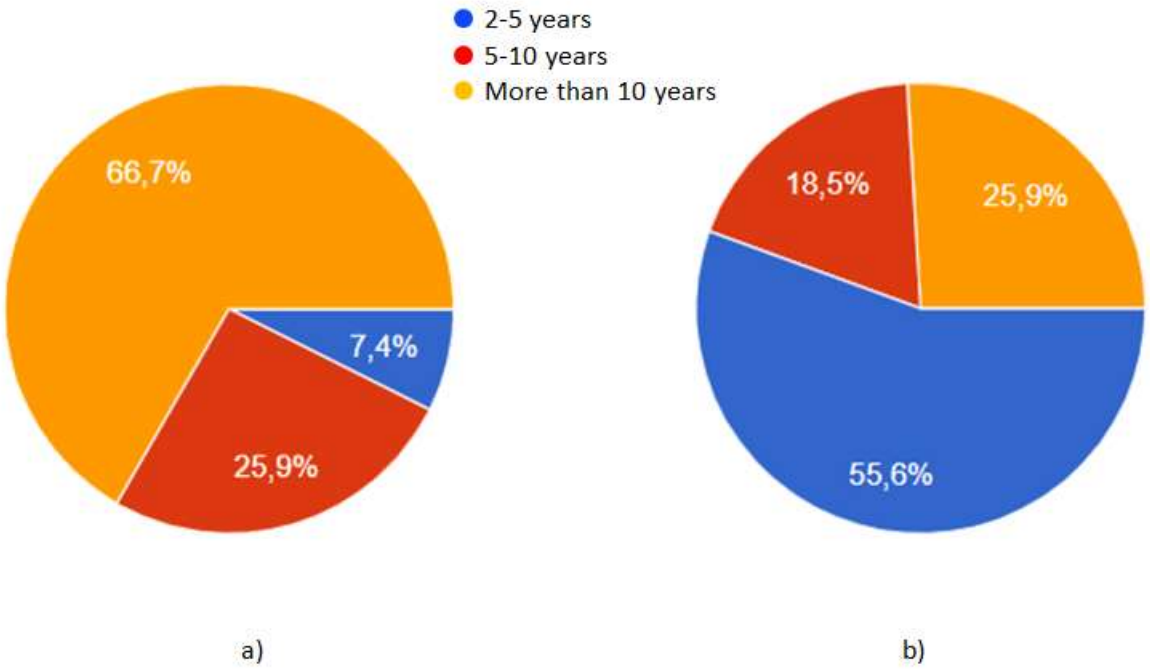


Figure 2. Professional experience in teaching: a) general; b) in the adult field.

As can be seen, despite the significant percentage of respondents possessing considerable experience in the teaching field (Figure 2a, 66.7 %), more than half of them are newcomers in the adults' education with the experience accumulated not exceeding five years (Figure 2b,55.6 %). Among the subjects taught, 11 persons have specified the majors related to the STEM field, among which one person serves as a supporting teacher. In contrast, the rest have indicated languages (Italian, French, English) and Music as their expertise areas.
Even though the majority worked in the adults' education for not more than five years, the awareness of the problems related to the field in terms of the institution's organisation and the reached users is quite matured. The lists presenting both weaknesses and strengths confirm the above:

Weaknesses

- poor collaboration and project design;
- less recognised at the institutional level for the specificity of adult education;
- discontinuity and non-constant attendance of students (due to work reason);
- low digital skills of students effect on distance learning;
- low digital skills of elderly teachers;
- insufficient equipment on the students' side (e.g. Wifi network);

- poor visibility/communication;
- less free training offers;
- poor resources for practical activities;
- no stable staff guaranteeing teaching continuity from one school year to another;
- different cultures and languages lack information on students' academic career, different learning approaches;
- too uneven users.

Strengths

- less number of students to organise better the school activity;
- the possibility to re-start to study in adult age;
- the possibility to help foreign citizens integrate into society with language and culture aspects;
- ability to modulate the courses;
- flexibility;
- the institution is the only organisation at the local level to provide adults with technical assistance;
- the wide training offers;
- training offers in line with the needs of the territory.

About the kind of teaching tools used to stimulate and motivate students' learning, respondents have been nominated: digital whiteboard, PC and smartphones, apps, ICT in general, online resources.
Besides, the following approaches are summarised below:

- dramatisations (role play);
- summary diagrams, conceptual maps, examples and troubleshooting of everyday life;
- instruments favouring active and participatory learning;
- interactive, visual, iconic, capable of involving even the youngest;
- laboratory experiences that find feedback with reality outside the school;
- direct involvement;
- practical examples;
- lab instruments and activities.

About the instruments used to encourage student's learning, the following tools were noticed:

- dialogues;
- graphics tablet and pen;
- participatory structuring of activities;

- authentic tests to share important information about primary needs;
- readings and exercises that arouse curiosity and metacognition;
- jamboard;
- relations with reality;
- authentic sources of dialogues in British English compared with typically Italian situations;
- pieces and tests approved by the British Council;
- video of real communicative situations, close to students' interests.

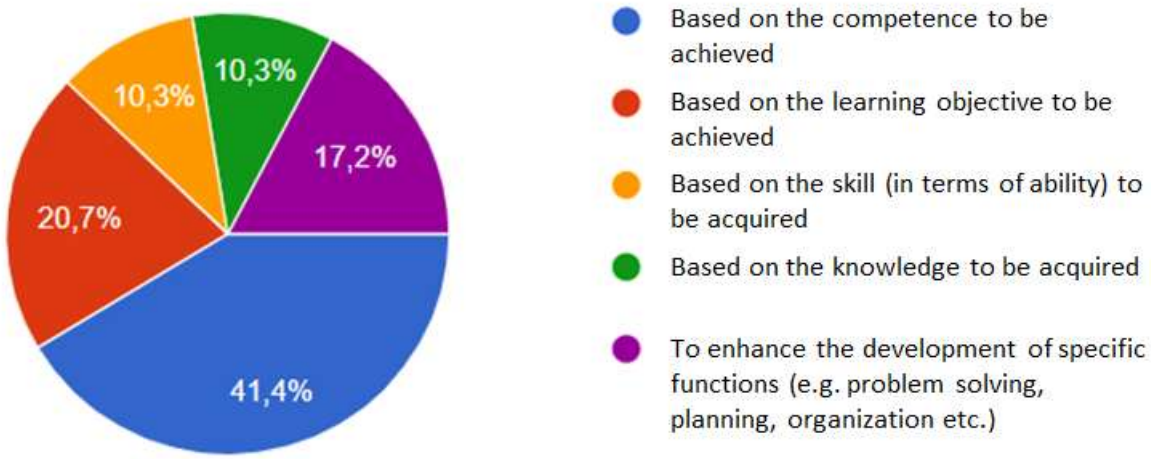


Figure 3. The modality for the selection of teaching resources for the students in Italy

According to Figure 3, most respondents rely on the competences to transfer, learning objectives to be achieved, and the specific functions' development enhancement. The least popular options are the skill and the knowledge to be acquired that have been checked by 10,3% of respondents.

Regarding the most suitable methods to be used with students, one may see that the most popular option is "work in a group". The second-ranked are lab tasks and problem-solving activities. Individual work seems to attract a modest 13,8%. While lessons in flipped classroom modality and theoretical lessons cumulatively share 7% of respondents' preferences. About the English language lessons, an option selected in the peer tutoring (composing a couple of an Italian English speaking student and a foreigner with knowledge of Italian) has proved to be effective (before COVID emergency, now are unavailable). The group is considered more functional for learning development instead in terms of relationship development.

1.5.2 Bulgaria

In Bulgaria, the analysis was based on 25 answers processed by a slight prevalence of females (56% of respondents). Serving principally within a school system (52 %), the professional experience of respondents both in education and in the adult field are summarised in Figure 4 below:

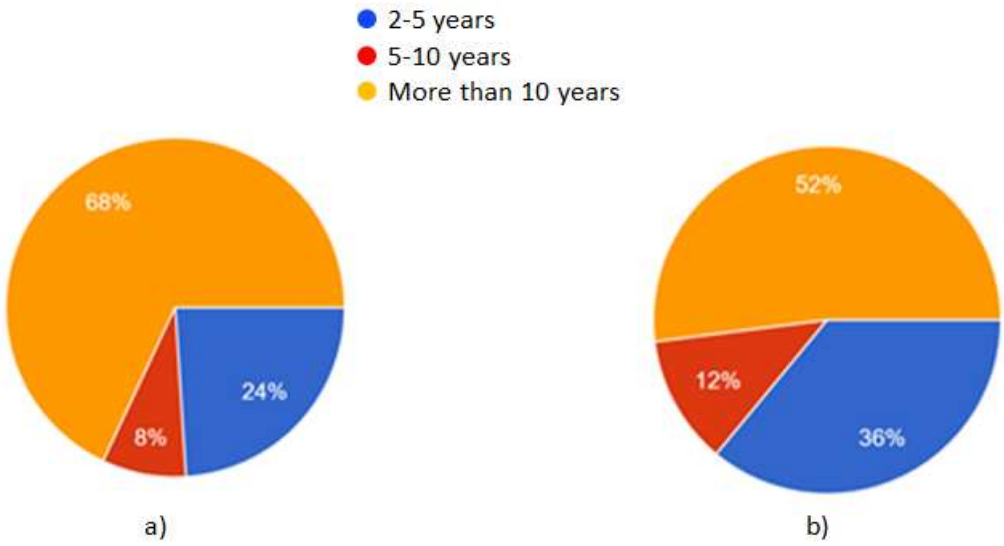


Figure 4. Professional experience in teaching: a) general; b) in the adult field.

The main percentage of respondents have significant teaching experience (Figure 4a, 68%), more than half of them have accumulated expertise in adult education (Figure 4b, 52%). Among the subjects taught, n. 20 people indicated the topics related to the STEM field; the rest indicated languages (Bulgarian, German) and economics as their areas of experience. The majority have been working in adult education for more than ten years.

About the awareness of the problems related to the field, you register the institution's organisation and the percentage of users who complete the course and achieve the title.

The lists, presenting both weaknesses and strengths, confirm the above:

Weaknesses

- individualised skills-based qualifications;
- demonstration of skills in competency tests and personalisation of tests, e.g. completion of only one module, not a full qualification.

Strengths

- flexible learning process;
- the education that adults receive has a positive effect on their lives and meets their needs;
- the use of technology in education.

Only motivated people are included, upgrading acquired knowledge, more consciously and responsibly focused on learning.

About the kind of teaching tools used to stimulate and motivate students' learning, respondents partially reproduced the content of multimedia tools, interactive whiteboard, digital display, computer and smartphones, applications, ICT in general, online resources. Besides, the following approaches are summarised below:

- brainstorming, role-play;
- project assignments, individual research assignments;
- interactive methods as situational methods, case studies, discussion;
- digital technologies as e-learning, web tutorials, presentations, videos, e-tests, computer models of real objects, e-crosswords, games;
- inverted classroom;
- practical tasks, laboratory exercises.

About the instruments used to encourage students' learning again, the variety of the answers received is quite similar to those obtained during the previous inquiries. Still, besides, the following tools were noticed:

- presentation, visual materials, diagrams;
- electronic textbooks and reference books, including in a foreign language;
- real parts, training car, tools, various machines, specialised textbooks on the subject;
- internet platforms, educational software;
- models;
- training boards.

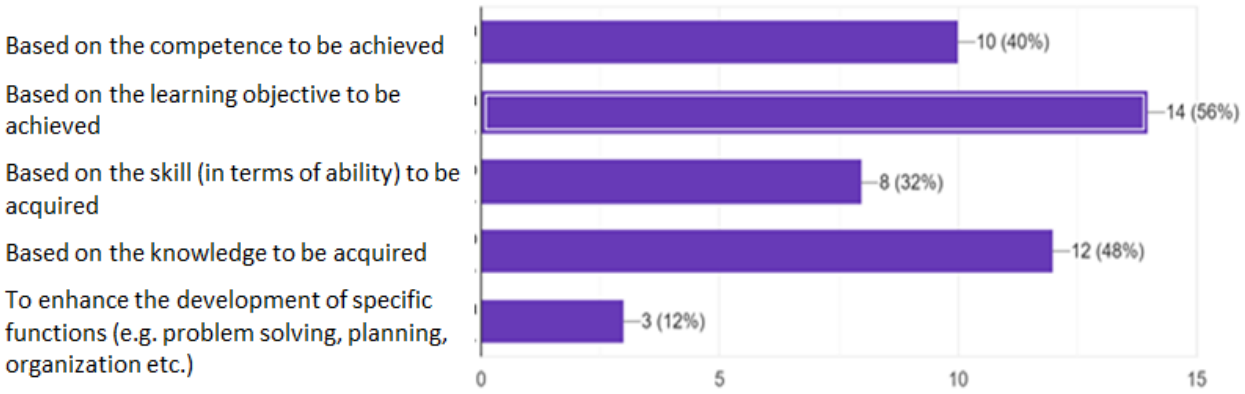


Figure 5. The modality for the selection of teaching resources for the students in Bulgaria

While choosing the learning resource for students, most respondents are based on the learning objectives to be reached, the knowledge to be acquired, and the competence to be achieved. The least popular options are to improve the development of specific functions, given by 12% of respondents.

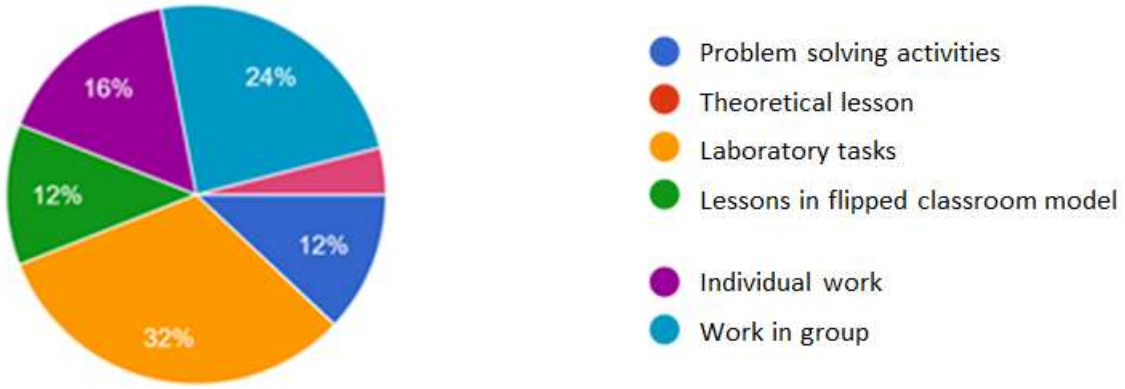


Figure 6. The most suitable method for your students.

About the best method, many respondents (32%) answered "laboratory tasks". This is since the respondents are teachers - engineers, teaching disciplines in vocational training.
Thirteen respondents on 25 consider the "group work" as an appropriate teaching method. The group is more functional for learning development than for relation development.

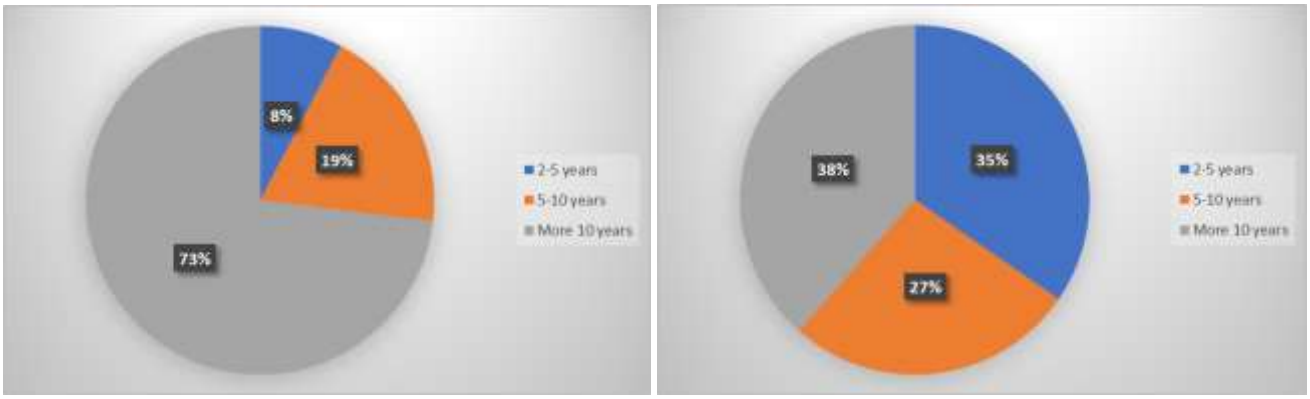
The organisation of the individual work for students is practised by the majority of respondents, 96 %. The self-study activities are held in the form of:

- consultation;
- project work;
- study of specific electronics;
- homework, tests, presentations;
- interest club, individual practical tasks;
- preparing for competition;
- solving problems;
- online test;
- individual research tasks; work on a project group task;
- video materials.

If the self-study activities are not practised, the primary motivations proposed are the class composition's heterogeneity in terms of preparation levels and students' native language, together with difficulty in connecting students to the Internet.

1.5.3 Romania

In Romania, the analysis was based on 26 answers processed by females' slight prevalence (61,50% of respondents).). Serving principally within a school system (65,4%), respondents' professional experience both in education and in the adult field are summarised in Figure 7 below.



a) b)

Figure 7. Professional experience in teaching: a) general; b) in the adult field.

As can be seen, the major percentage of respondents possess significant experience in the teaching field (Figure 7a, 73%), and most of them have accumulated expertise in adult education (Figure 7b, 38%). Among the subjects taught, 14 persons have specified the STEM field majors, whereas the rest have indicated languages (English, French, Romanian) and Economics as their areas of expertise.

The majority worked in the adults' education for more than ten years. The awareness of the problems related to the field in terms of the institution's organisation and the reached users is quite matured. The lists presenting both weaknesses and strengths confirm the above:

Weaknesses

- discontinuity in the learning process;
- demotivation;
- absenteeism;
- lack of digital devices or certain laboratory equipment;
- different learning approaches.

Strengths

- a high number of trained staff and programs;
- the collaboration among teachers to enhance their skills;
- the willing to incorporate innovation into goals for school processes and practices;
- quality leadership;

- advanced laboratory equipment;
- flexibility;
- teachers' interest in effective education and constant training.

Regarding the multimedia teaching tools used during the face-to-face lessons, the responses stated: PCs, interactive multimedia whiteboards, video projectors, smartphones, tablets and apps (Learning App), online courses, simulators.

About the kind of teaching tools used to stimulate and motivate students' learning, respondents have been nominated: multimedia whiteboards, online resources, learning apps, applications, animations, conceptual maps, prototypes, templates, PC and smartphones, ICT in general.

Besides, the following approaches are summarised below:

- project assignments;
- individual student activities;
- roundtable Learning Strategy;
- panel Discussion;
- teacher-student interaction / student-student interaction;
- flipped classroom;
- interactive methods, brainstorming, role-play;
- digital technologies - presentations, animations, videos, e-tests, interactive game activities, computer models of real objects;
- practical tasks, laboratory activities.

About the instruments used to encourage student's learning, the following tools were noticed:

- use of audio, visuals and videos;
- prototypes, training cars, devices;
- hands-on demonstration;
- learning apps;
- internet platforms.

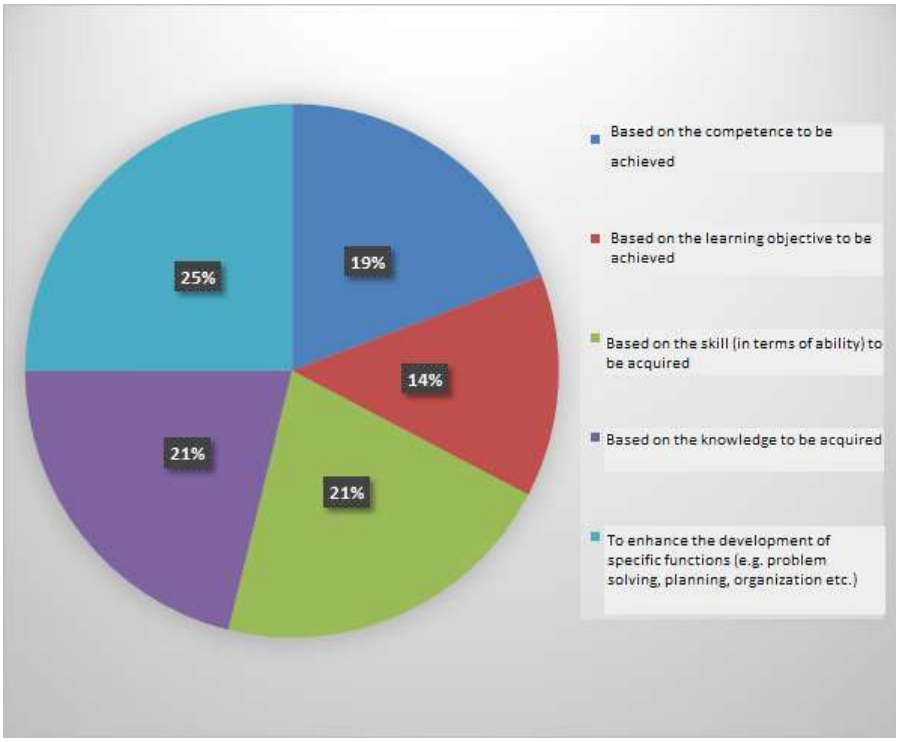


Figure 8. The modality for the selection of teaching resources for the students in Romania.

On the base of the data shown in Figure 8, 25% of respondents are interested in enhancing the development of specific functions (e.g. problem-solving, planning, organisation etc.), in the knowledge to be acquired (21%), in the skill (in terms of ability) to be reached (21%), and in the competence to be achieved (19%). The learning object to be performed is the least popular option, and it has been given by 14% of respondents.

Regarding the most suitable methods to be used with students, the popular option is to work in a group (30%) and problem-solving activities (30%). The second-ranked are laboratory tasks (21%). Lessons in flipped classroom modality attract 13% of the respondents, and individual work shares 6% of respondents' preferences.

Behind the reasoning for those who chose "work in the group", 16 respondents considered it to be the most suitable teaching method, and a majority of 67% finds it essential for learning development. In contrast, 33% appreciated its role in relationship development, as reflected below. The group is considered more functional for learning development compared to relationship development.

1.5.3 Spain

In Spain, the analysis was based on 26 respondents, of which 20 are women, and 6 are men, as following:

- 5 teachers are from Initial Education.
- 9 of Basic Vocational Training (FPB)
- 12 of Secondary Education.

As can be seen, despite the significant percentage of respondents possessing significant experience in the teaching field:

- 17 teachers have been teaching for more than 10 years.
- 4 teachers have been teaching between 6 and 10 years.
- 5 teachers have been teaching for 5 years or less.

Weaknesses

It is essential to underline that many of our students are far from being able to incorporate new technologies into their education process quickly and efficiently. The main reason is the technological gap, the lack of economic resources. However, we must point out that our CEPA is implementing a project for the loan of computer terminals to "minimise" or, at least, reduce this problem. Another reason has to do with age diversity. The youngest students are familiar with new technologies, but ICTs sometimes pose an added difficulty to their learning for older students.

Strengths

All teachers use digital tools for their activity.

All the teachers of *Enseñanzas Iniciales* use the technologies in the classroom as:

- virtual classroom offered by the Community of Madrid to provide students with the content they must work on and as a means of communication;
- educational websites where teachers extract photocopiable materials or play interactive games through the PDI.

In some Level II groups, digital classes are already fully implemented. In this case, the teaching-learning process is carried out through the completion of projects by the students. They can find in the Virtual Classroom the contents they have to investigate. Besides, they must develop the project by using programs to create text productions and exhibitions through slides, which they upload to the Virtual Classroom send by email to the teacher.

As methodologies, problem-solving is a central axis in the teaching-learning process. This means that students are trained to apply the content learned to real life.

In *Enseñanzas Iniciales*, with older students, it's necessary to pay attention to the specificity of the lifelong learning initiative, which implies a series of crucial aspects that must be at the base of the proposed didactic methodology (Bendicho Montes, 2004). Thus, this methodology should meet the following characteristics:

- enabling;
- motivating;
- flexible;
- not competitive;
- active.

In *Secondary Education*, in recent years, the student's profile in adult centres has been changing, as younger ones, considered digital natives, are increasingly enrolling. In this way, it is convenient to create partnerships with ICTs to achieve meaningful learning in line with simultaneous intelligence using the following resources:

- classic blackboard as support for the oral explanation of the topics;
- photocopied materials, textbooks, notes and cards;
- news, schemes and concept maps;
- digital board;
- computer;
- digital book;
- projector;
- tablet;
- mobile apps;
- virtual classrooms Moodle and Google Classroom
- presentations;
- videos;
- websites with self-correcting online activities;
- didactic applications;
- virtual classrooms;
- videoconferences;
- explanations through audios.

In the *Vocational Training*, it corresponds to the Computer Science and Communications family. Therefore, the integration of ICT has been straightforward and intuitive since practically all curriculum areas necessarily imply the use of tools and devices linked to technology. The standard equipment available in classrooms for the daily

work of teachers and students includes one PC for student and teacher's laptop connected to the following devices:

- projector;
- digital board;
- printer;
- built-in webcam;
- simulation tools for electronics and networks in the specific workshops of some subjects;
- a mobile phone that the students occasionally use to search for information and participate in multimedia activities.

The main methods used in the Basic Vocational Training segment in our centre are the following:

- slide presentations and digital texts to reinforce the theoretical lesson;
- viewing videos and photos;
- joint production (teacher-student) of interactive materials with the contents of technical and non-technical subjects;
- structuring and organising content in personal learning environments (PLE);
- continuous use of the computer as support for the evaluation activities of the students;
- design and creation of the digital portfolio;
- participation in webinars and courses;
- use of synchronous communication tools (with and without video) and asynchronous (email and chat groups).

In *Secondary Education*, regarding the use of digital methodologies, teachers have observed that students have digital training deficiencies and lack of technological resources. This fact makes it challenging to implement this type of methods in teaching.

In *Secondary Education*, about the kind of teaching tools used to stimulate and motivate students' learning, respondents h stand out: use of videos related to the subject, group activities, other types of materials, from educational games to computer programs and mobile applications.

About the instruments used to encourage student's learning, the following tools were noticed:

- schemes and concept maps;
- oral presentations;
- teamwork and cooperative activities;
- interactive games;
- digital presentations;

- use of Virtual Classrooms;
- educational applications.

Thus, the teacher's choice of the resources mentioned above is mainly due to their ability to facilitate the acquisition of the competencies, knowledge and skills that they intend to work on and that is selected, to a lesser extent, for the development of specific functions (resolution of problems, planning and organisation).

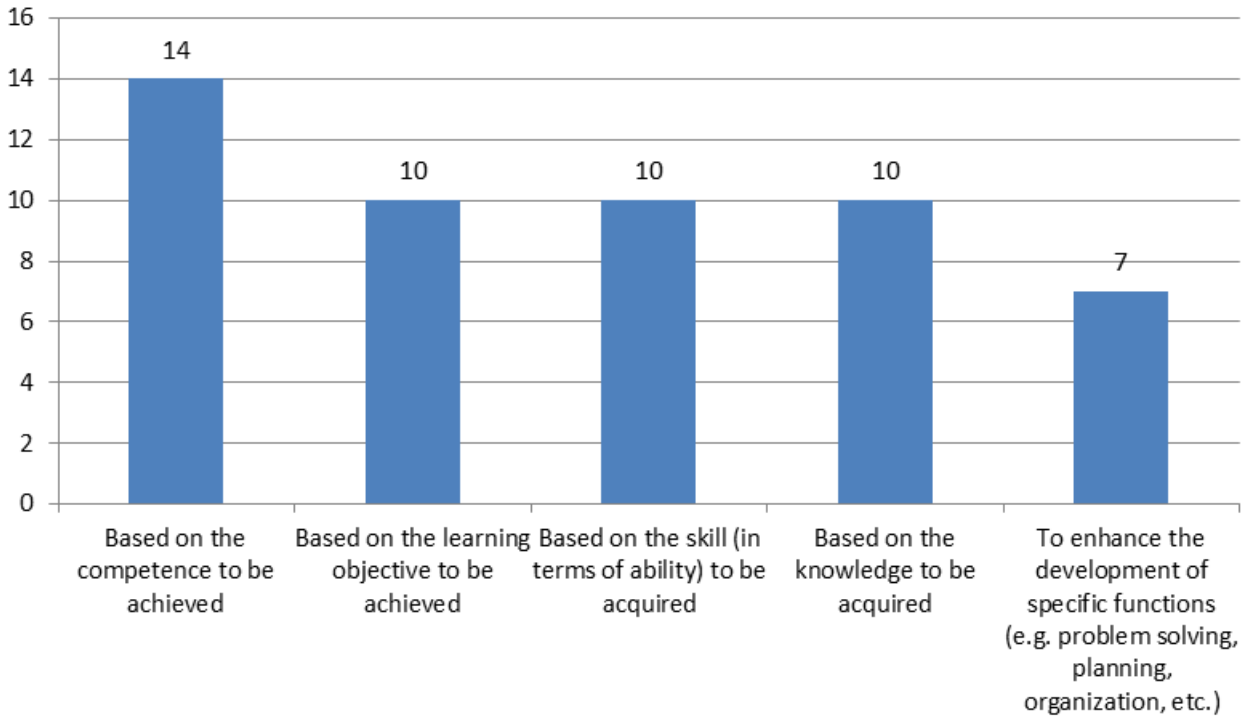


Figure 9 - How do you select a teaching resource for your students?

Based on the data shown in Figure 9, the majority of respondents rely on the competences to be achieved.

Regarding the most suitable methods to be used with students, one may see that options are work in a group, problem-solving activities and laboratory tasks. The group is considered more functional for learning development (80%) instead of relationship development (20%).

Thus, all secondary school teachers who recognised group work as positive conceive this methodology as a strong point for the development of learning and social relationships. Some teachers also consider individual work, the theoretical lesson, the Flipped Classroom model and the laboratory tasks positive.

Besides, In the *Vocational Training* since the 2018/19 academic year, with the installation of a GARAGE LAB in the centre [http://fablabssociales.org/content/garagelab-cepa-casa-de-la-cultura-getafe/], within the 2nd year courses, the following methodologies were integrated into this space:

- Design Thinking;
- Project-Based Learning (PBL).

These methodologies entail an acceptable use of ICT tools related to digital manufacturing (Tinkercad, Arduino SDK, and Inkscape, among others). The sessions carried out in the classroom dedicated to the GARAGE LAB necessarily imply group work, work in pairs and the continuous exposure and communication of the decision-making that each group is making in its project, so that all the ICT tools linked to team communication, coordination and planning will be the preferred option.

2. MAPPING OF DIGITAL SKILLS IDENTIFIED FOR THE INTEGRATION OF TECHNOLOGIES INTO THE CLASSES FOR ADULT EDUCATION

To improve the teaching quality and reinforce both teaching and learning processes in adult education, the needed skills for the use of technology should be defined.

In this framework, two theoretical perspectives are identified as follows:

1. Lifelong lifewide and lifedeep learning;
2. Competency-based education.

Lifelong lifewide and lifedeep learning refers to the three dimensions of learning: vertical (long), horizontal (wide) and in-depth (deep).

First of all, **lifelong learning** (vertical dimension) is defined as "all learning activity is undertaken throughout life, to improve knowledge, skills and competences within a personal, civic, social and/or employment-related perspective" (COM 678, 2001). It is often considered learning that occurs after the formal education years of childhood (where learning is instructor-driven—pedagogical) and into adulthood (where the learning is individually-driven—andragogical). It is sought out naturally through life experiences as the learner seeks to gain knowledge for professional or personal reasons. These natural experiences can come about on purpose or throughout life's unpredictable course. 'Knowledge results from the combination of grasping experience and transforming it (Kolb D. A. et alii, 2001). The concept of lifelong learning has become vital with the emergence of new technologies that change how people receive and gather information, collaborate with others, and communicate.

Secondly, **lifewide learning** (horizontal dimension) concerns all contexts of life. It represents the overcoming of proper places dedicated to education, so in addition to the formal context, "informal and non-formal contexts" are relevant for life experience. It recognises that learning occurs in multiple contexts within a learner's life: school, home, work, etc. It is how an educational institution encourages, supports and recognises students' lifewide learning. It is a concept that is compared and contrasted to lifelong education, recognising that not only does learning occur continually throughout one's life, but it also occurs broadly across every situation in one's life (Aleandri G., 2011).

Finally, the third dimension (deep) occurs in **lifedeep learning**. It concerns beliefs, values and orientations for life (Banks et alii, 2007; Dewey, 1899) to participate fully in the community life. This dimension shifts the focus from economic competition to the community's joint commitment and each person for their full development (transformative dimension, depth, transformative learning). Therefore, it regards what is related to the social, cultural, moral, spiritual, communicational and ethical values that lead people to act, learn, believe and think in a particular way.

Competency-based education (Serdenciuc N. L., 2013) is addressed to develop key competencies necessary for the successful participation in social life: "skills in processing information, solving problems, critical thinking, possessing native and foreign languages, systemic thinking, life-long learning competence" (T. Lobanova, Yu. Shunin, 2008); values experiential learning (J. Hill, P. Houghton, 2001), "integrated and problem-based curricula" (D. Loewenberg Ball, F.M. Forzani, 2009), the attainment of competencies can be also assessed by observation and roleplaying in simulated situations (J.P. Mahon, 1980).

Usually, teacher education providers have opted for isolated ICT courses or units, often positioned early in the students' qualification programme to improve their digital literacy (Falloon, G., 2020). The aim is to provide students with essential knowledge and skills able to support them to complete course assessment requirements, for example, using "technology integrated" units of learning (Kleiner et al., 2007; Polly et al., 2010). This approach's success is focused on building students' confidence and attitudes towards digital resources in teaching and learning (Foulger et al., 2012). However, on the base of different surveys, this approach fails in building broader and deeper understandings of the knowledge and capabilities needed to prepare future students for their future life, because the result is a decontextualisation of the use of digital resources and an acquisition of isolated technical skills (Janssen et al., 2013).
Therefore, from the traditional approaches based on developing students' digital literacy, we need to move towards digital competences development to ensure a broader understanding of technology's potentialities in the class.

2.1 Competence definition

The competences are a unique resource, but they can be modified according to the context. People develop and grow to start from social, formative and family experiences. Therefore, competencies are the result of processes combing relational, emotional, cognitive and value factors. Besides, competencies result from the individual's experience and are modified during the learning process or work experience of individuals by moving from one context to another.
There are four dimensions of competency:

- **Task skills**

  Performing the task/job to the required standard.
- **Task management skills (variables)**

  Able to do more than one thing at a time and managing the tasks correctly.
- **Contingency management skills**

  Responding appropriately to irregularities and breakdowns in a routine within a job or workplace.

- **Job/role environment skills (outcomes)**

  Able to deal with the responsibilities and expectations of the work environment.

A person is defined as competent when they can demonstrate that they can apply knowledge and skill successfully in their working environment.

Success is measured against the performance criteria set down in a set of standards.

These standards of competence will focus primarily on:

- Expectations – What can you expect from a person at this level?
- Application – Can the person apply what s/he has been taught?
- Outcomes – What will be the outcomes?
- Variable conditions – What range of contexts can the new skills be applied?
- Content of transference – Can the new skills be transferred to new situations?

There are different definitions of “competence” that can be synthesised according to the two approaches here below:

- according to a more managerial direction, competence is individual capital and then it is a codifiable, measurable, certifiable resource, but it is bounded to performances. Professional competence refers to motivations, personality features, self-image, values, knowledge, practical skills. Individual tasks become an expression of the personality of individuals, also influenced by motivational and biological factors, and the skills coincide with observable behaviours;
- Based on a social and cultural approach, competence is a relational resource and then comes from working, organisational, and training practices (Piaget's cognitivism). In 2008 the European Union drew up the European Qualification Framework (EQF), in which competence is defined as the ability to use the knowledge and methodological skills to solve problems and complete tasks in study and work situations.

In this context, training "students competent" means they can become thinking and responsible citizens, aware of their knowledge, professionalism, and life choices, ready to share and interact with others.

Each competence comprises a balanced combination of knowledge (knowing what) and learning how to do and understand to be (skills and attitudes).

Usually, the expression "know-how" means applying knowledge in authentic contexts to perform an established task. In brief, knowledge and skills must be combined and utilised appropriately. Since they are dynamic and contextualised, they should be coordinated with **internal resources** (as knowledge structured preserved permanently by people; internal dispositions setting in motion and coordinating knowledge, skills to

carry out successfully the tasks; thought patterns, values) and **external resources** (objects and materials available to the individuals for solving a problem; other people who are in the context).

On the base of the "Recommendation on Key Competences for Lifelong Learning" by the European Commission, eight key competences for life-long learning are defined as "*a combination of knowledge, skills and attitudes that are adequate to the context*" (Council E., 2018), and they are as follows:

1. literacy competence;
2. multilingual competence;
3. mathematical competence and competence in science, technology and engineering;
4. digital competence;
5. personal, social and learning to learn competence;
6. citizenship competence;
7. entrepreneurship competence;
8. cultural awareness and expression competence.

These competencies are all considered equally important. Each of them contributes to a successful life in society. These competencies can be applied in many different contexts and in various combinations where the aspects essential to one domain support competence in another domain.

The updated concept of digital competences as one of the key competences is related to the necessity that the individuals should understand how digital technologies can support communication, creativity and innovation, and be aware of their opportunities, limitations, effects and risks. They should understand the general principles, mechanisms and logic underlying evolving digital technologies and know the primary function and use of different devices, software, and networks. Individuals should take a critical approach to the validity, reliability and impact of information and data made available by digital means and be aware of the legal and ethical principles involved in engaging with digital technologies.

Individuals should use digital technologies to support their active citizenship and social inclusion, collaboration with others, and creativity towards personal, social or commercial goals.

The digital skills include the ability to use, access, filter, evaluate, create, program and share digital content. Individuals should be able to manage and protect the information, content, data, and digital identities and recognise and effectively engage with software, devices, artificial intelligence, or robots.

Regarding the attitudes, the engagement with digital technologies and content requires a reflective and critical, yet curious, open-minded and forward-looking attitude to their evolution. It also requires an ethical, safe and responsible approach to the use of these tools.

2.1.1 Digital competence

Digital competences appeared for the first time in the new framework of key competences for lifelong learning (Council E., 2018), reflecting an understanding of digital knowledge which goes beyond the strictly technical and procedural notions characterising previous European approaches.

As opposed to mere ICT skills conceptualisation of the original ECDL (ICDL outside Europe), the digital competences' updated concept now incorporates aspects such as the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competencies related to cybersecurity), intellectual property related questions, problem-solving and critical thinking.

The use of "digital literacy" instead of "digital competence" (Figure 10) has been increasingly contested with the emerging of new technologies and new applications for technology (Falloon G.,2020). Sometimes the terms used have been different such as information literacy' (Zurkowski 1974), 'computer literacy' (Tsai 2002), 'internet literacy' (Harrison 2017), 'media literacy' (Christ and Potter 1998) and recently, 'multi-modal literacy' (Heydon 2007). However, all of them have been associated with the effective use of digital resources in teaching and learning processes and included as relevant components of "digital literacy" (Grusczynska and Pountney 2013).

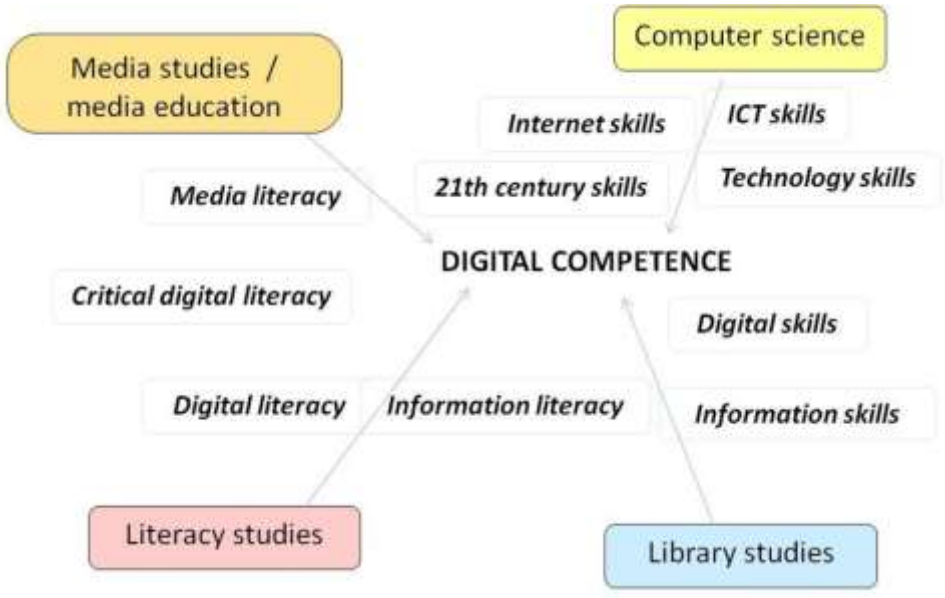


Figure 10. Digital competence, background disciplines and related concepts
Source: Ilomäki, L., Kantosalo, A., & Lakkala, M. (2011).

Even if it is not easy to reach a single definition of "digital literacy" due to the constant technological evolution (Helsper E., 2008), these approaches have been criticised for their narrow technical skills focus, lack of authenticity, failure to take account of different socio-cultural contexts for technology use, and their

ineffective, reductive design (Gruszczynska et al. 2013; Ottestad et al. 2014) by ignoring those elements, equally important, such as ethical, digital citizenship, health, wellbeing, safety and social/collaborative (Foulger et al. 2017).

More recent studies don't focus any more on technical skills-focused digital literacy but on broader digital competency models where knowledge, capabilities and dispositions are combined together.

As Janssen et al. stated on "digital competence":

"…digital competency clearly involves more than knowing how to use devices and applications… which is intricately connected with skills to communicate with ICT, as well as information skills. Sensible and healthy use of ICT requires particular knowledge and attitudes regarding legal and ethical aspects, privacy and security, as well as understanding the role of ICT in society and a balanced attitude towards technology…" (Janssen et al. 2013, p. 480).

This last definition also introduces dispositional and attitudinal elements— or "mind-set" so-called by Janssen et al. (2013; p.474) towards technological innovations, to better understand and critically appraise their role and influence in forming new practices.

In this context, a new challenge is prepared for teachers who need, on the one hand, to better support their students in utilizing digital resources and, on the other hand, to help them understand the impact of the technology. However, digital competence implies its constant revision due to all the technologies' evolving nature (Janssen et al., 2013).

In summary, "digital competence" is related to various skills and competences, and its scope is in several areas: media and communication, technology and computing, literacy, and information science. It consists of (i) technical skills to use digital technologies, (ii) abilities to use digital technologies in a meaningful way for working, studying and for everyday life in general in various activities; and (iii) abilities to critically evaluate the digital technologies, and 4) motivation to participate in the digital culture (Ilomäki L. et alii, 2011).

2.2 European overview of the digital skills required in adult education: DigComp Framework

To understand the key elements of digital competence and how to assess it, the European Commission developed a Digital Competence Framework for Citizens. The Digital Competence Framework for Citizens, also known by its acronym DIGCOMP, was first published in 2013 by the European Commission and then revised and updated (Redecker C, 2017). Its latest version, DIGCOMP 2.1, dates back to 2017.

DIGCOMP aimed to be a fundamental tool to tackle the digital transformation challenge, improve citizens' digital competence, help policymakers formulate policies that support digital competence building, and plan education and training initiatives to improve the digital competence of specific target groups.

DIGCOMP also provides a common language on identifying and describing the key areas of digital competence and is the main reference in Europe today for the development and strategic planning of digital competence initiatives[2]. Furthermore, new frameworks have been derived from DIGCOMP for new contexts where digital competence is needed. In collaboration with the Directorate-General for Justice and Consumers and the Joint Research Centre (JRC), additionally have been developed related competence frameworks in the fields of education and training, employment and lifelong learning. Examples of this work include the Digital Competence of Educators (DigCompEdu) (Ghomi, M. et alii, 2019), the Entrepreneurship Competence Framework (EntreComp[3]) and the European Framework for Digitally-Competent Educational Organisations (DigCompOrg[4]).

The DIGCOMP describes the competencies necessary today to use digital technologies in a confident, critical, collaborative and creative way for carrying out activities and achieving goals related to work, learning, leisure, inclusion and participation in our digital society.

Since its inception, the DIGCOMP framework has been well received and taken up by various stakeholders. This versatile instrument is used for various purposes, as follows:

- policy formulation and support - is one of the purposes of DIGCOMP use at the national and regional level. To help policymakers to obtain a macro-level view of citizens' digital competence, the European Commission has developed a Digital Skills Index (DESI);
- instructional planning for education, training and employment;
- assessment and certification.

In an attempt to share practices and offer peer learning opportunities around the implementation of DIGCOMP, in 2015, an "Implementation Gallery" was launched on the JRC Science Hub website[5].

[2] https://ec.europa.eu/jrc/en/digcomp
[3] https://ec.europa.eu/jrc/en/entrecomp/
[4] https://ec.europa.eu/jrc/en/digcomporg
[5] https://ec.europa.eu/jrc/digcomp/implementation

The latest version of the Digital Competence Framework for Citizens (version 2.1) is structured in five dimensions (competence areas).

Five Competence areas currently are identified to be part of digital competence: 1) Information and data literacy; 2) Communication and collaboration; 3) Digital content creation; 4) Safety; 5) Problem-solving. The competence areas of 1, 2 and 3 deal with competencies that can be retraced in specific activities and uses. Competence areas 4 and 5 are "transversal" as they apply to any activity carried out through digital means. Problem-solving elements, in particular, are present in all competence areas. Still, a specific area was defined to highlight this aspect's importance for appropriating technology and digital practices (Please see the following Figure).

Figure 11. DIGCOMP Competence areas

- dimension 1: Areas identified to be part of the digital competence;
- dimension 2: Competence that is pertinent to each area (21) with their title and descriptors;
- dimension 3: Eight Proficiency levels for each competence, that is; Foundation > Level 1 & Level 2; Intermediate > Level 3 & Level 4; Advanced > Level 5 & Level 6; Highly specialised > Level 7 & Level 8;
- dimension 4: Knowledge, skills and attitudes applicable to each competence;
- dimension 5: Examples of use on the applicability of the competence to different purposes.

The process of updating DIGCOMP is advancing in two phases (Please see the next Figure).

- phase 1: the update of the "conceptual reference model" - in other words, updating the competence areas, the competence descriptors and their titles;
- phase 2: the update of the "framework", i.e. the proficiency levels related to the competences and the knowledge, skills and attitudes applicable.

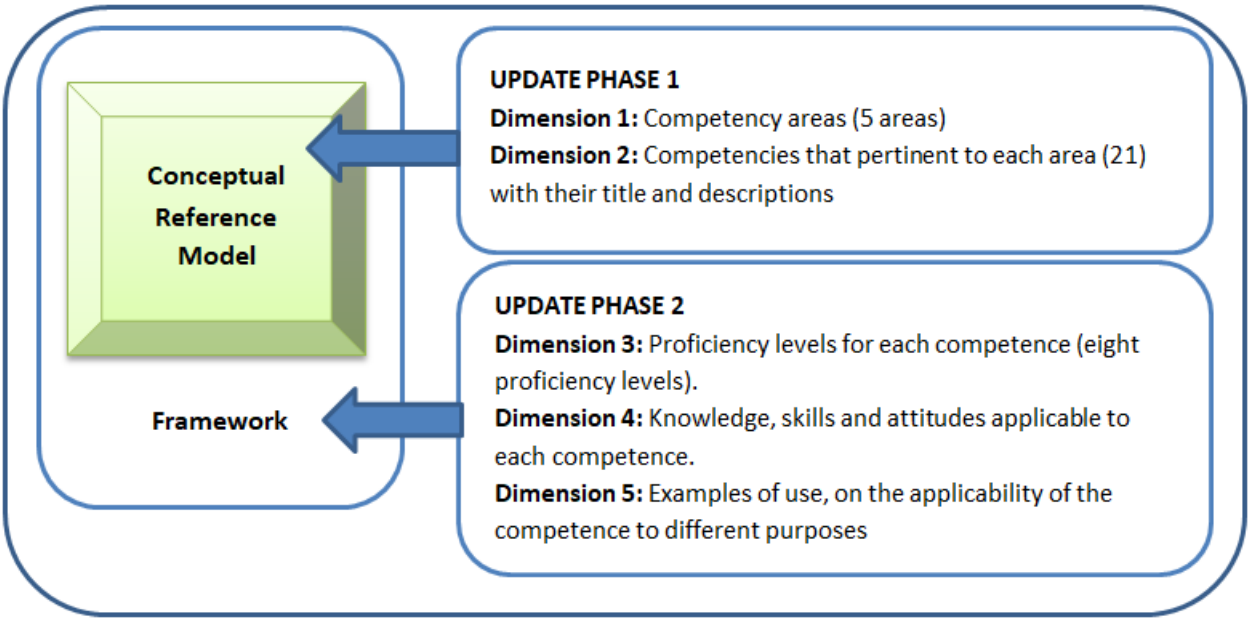


Figure 12. DIGCOMP Framework update phases (Our own adaptation[6])

The following table presents the DIGCOMP dimensions 1 and 2 according to DIGCOMP 2.1 and the interconnection between them.

Table 4. DigiComp Conceptual Reference Model

Competence areas (Dimension 1)	Competences (Dimension 2)
1. Information and data literacy	1.1 Browsing, searching and filtering data, information and digital content *To articulate information needs, search for data, information, and content in digital environments, access them and navigate between them. To create and update personal search strategies.* 1.2 Evaluating data, information and digital content *To analyse, compare and critically evaluate the credibility and reliability of data sources, data and digital content. To analyse, interpret and critically evaluate the data, information and digital content.* 1.3 Managing data, information and digital content *To organise, store and retrieve data, information and content in digital environments. To organise and process them in a structured environment.*
2. Communication	2.1 Interacting through digital technologies

[6] https://publications.jrc.ec.europa.eu/repository/bitstream/JRC101254/jrc101254_digcomp%202.0%20the%20digital%20competence%20framework%20for%20citizens.%20update%20phase%201.pdf

and collaboration	*To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context.* 2.2 Sharing through digital technologies *To share data, information and digital content with others through appropriate digital technologies. To act as an intermediary, to know about referencing and attribution practices.* 2.3 Engaging in citizenship through digital technologies *To participate in society through the use of public and private digital services. To seek opportunities for self-empowerment and participatory citizenship through appropriate digital technologies.* 2.4 Collaborating through digital technologies *To use digital tools and technologies for collaborative processes, and co-construction and co-creation of resources and knowledge.* 2.5 Netiquette *To be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.* 2.6 Managing digital identity *To create and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services.*
3. Digital content creation	3.1 Developing digital content *To create and edit digital content in different formats, to express oneself through digital means.* 3.2 Integrating and re-elaborating digital content *To modify, refine, improve, and integrate information and content into an existing body of knowledge to create new, original and relevant content and knowledge.* 3.3 Copyright and licenses *To understand how copyright and licenses apply to data, information and digital content.* 3.4 Programming *To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.*
4. Safety	4.1 Protecting devices *To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security measures and to have due regard to reliability and privacy.* 4.2 Protecting personal data and privacy *To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a "Privacy policy" to inform how personal data is used.* 4.3 Protecting health and well-being *To be able to avoid health-risks and threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible*

	dangers in digital environments (e.g. cyberbullying). To be aware of digital technologies for social wellbeing and social inclusion. 4.4 Protecting the environment *To be aware of the environmental impact of digital technologies and their use.*
5. Problem solving	5.1 Solving technical problems *To identify technical problems when operating devices and using digital environments, and to solve them (from troubleshooting to solving more complex problems).* 5.2 Identifying needs and technological responses *To assess needs and to identify, evaluate, select and use digital tools and possible technological responses to solve them. To adjust and customize digital environments to personal needs (e.g. accessibility).* 5.3 Creatively using digital technologies *To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments.* 5.4 Identifying digital competence gaps *To understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up-to-date with the digital evolution.*

Regarding the proficiency levels, DIGCOMP 1.0 Framework (2013) had three proficiency levels in Dimension 3 (foundation, intermediate and advanced). DIGCOMP 2.0 Framework (2016) maps out 4 general proficiency levels (foundation, intermediate, advanced, highly specialised). These have been increased to eight levels in DIGCOMP 2.1 (2017). A wider and more detailed range of proficiency levels supports the development of learning and training materials. It also helps in the design of instruments for assessing the development of citizens' competence, career guidance and promotion at work.

The eight levels provide the granularity needed to develop learning materials, assess and recognise learning progression, and describe tasks and competences in detail.

Each of these eight levels' descriptions represents the steps of the learners in the following three domains:

- the acquisition of knowledge of the competence;
- the complexity of the tasks they can handle;
- their autonomy in completing the task.

Eight proficiency levels for each competence have been defined through learning outcomes (using action verbs, following Bloom's taxonomy – Figure 13) and inspired by the structure and vocabulary of the European Qualification Framework (EQF). Please see the 4 overall and the eight granular proficiency levels and their descriptions in Table 5.

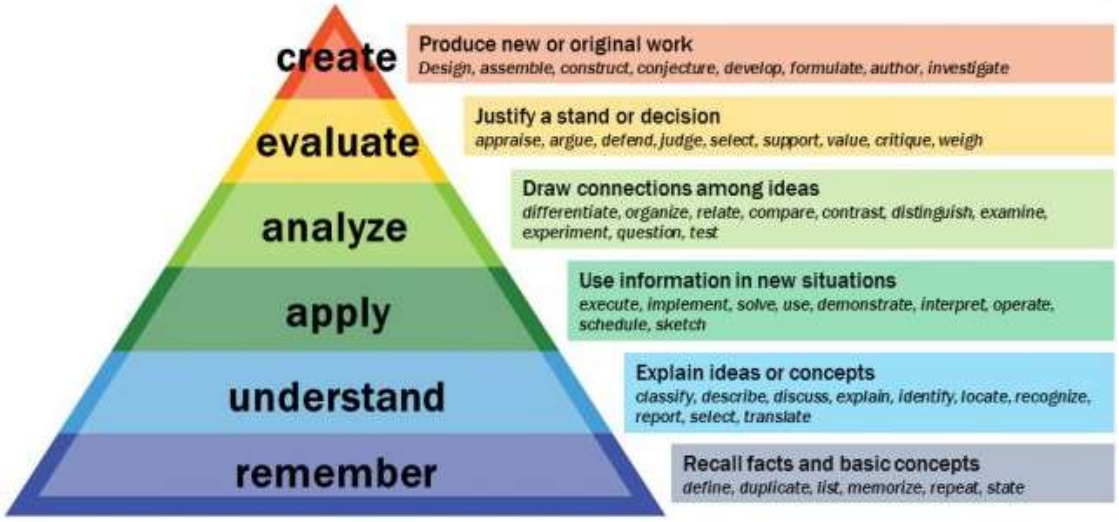


Figure 13. Bloom's taxonomy

Table 5. DIGCOMP 2.1 proficiency levels [7]

4 OVERALL LEVELS	Foundation		Intermediate		Advanced		Highly specialised	
8 GRANULAR LEVELS	1	2	3	4	5	6	7	8
COMPLEXITY OF TASKS	Simple task	Simple task	Well-defined and routine tasks, and straightforward problems	Tasks, and well-defined and non-routine problems	Different tasks and problems	Most appropriate tasks	Resolve complex problems with limited solutions	Resolve complex problems with many interacting factors
AUTONOMY	With guidance	Autonomy and with guidance when needed	On my own	Independent and according to my needs	Guiding others	Able to adapt to others in a complex context	Integrate to contribute to the professional practice and to guide others	Propose new ideas and processes to the field
COGNITIVE DOMAIN	Remembering	Remembering	Understanding	Understanding	Applying	Evaluating	Creating	Creating

[7] Source: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC110624/dc_guide_may18.pdf

DIGCOMP framework is flexible enough to be used in different sectors, where digital competence is increasingly important as follows:

- education and training: digital competence is relevant at all levels of the educational system (including school and higher education) for several reasons, ranging from active citizenship to using ICT for learning purposes, to job search;
- life-long learning and social inclusion: digital competence is also important in everyday life, and the lack of digital competence can increase the risk of social exclusion of already disadvantaged people (e.g., disabled people, migrants, older people etc.);
- employment and workplace: digital competence is necessary today in the workplace, at different (more general or more specialised) levels, since an increasing number of job profiles requires the mastering of digital skills.

In these fields, DIGCOMP has been used with a variety of purposes that are of interest for understanding its role in adult education, namely:

- as a tool to analyse the digital skills requirements of various jobs and to define the related professional digital profiles;
- as a tool to assess and certify the digital skills levels;
- as a tool to design, develop and deliver digital competence training programmes.

The following sections of this report discuss the issues related to life-long learning and inclusion and employment, looking at how the acquisition of digital competence has come into play in the lives of adults, whether they are at risk of social exclusion or workers needing to update their skills.

2.2.1 Digital competencies and social inclusion

A relevant field of interest for adult education trainers in digital competence focuses on adults at risk of social exclusion, particularly people on the margins and older people who need to develop digital skills to keep their social relations and train their cognitive skills in a digital world.

According to Eurostat data[8], people with low education levels or low incomes continue to be at risk of digital exclusion. In contrast, the number of people with a low level of digital skills increases with age. For example, while 96% of 16-24 year-olds living in the EU-28 use the Internet at least once a week, only 57% of people aged 55-74 do it.

[8] https://ec.europa.eu/eurostat/web/digital-economy-and-society/overview

In 2019 the Directorate-General for Employment, Social Affairs and Inclusion (European Commission) had published Inspirational practices for tomorrow's inclusive digital world (EC, 2019), where good practices in the area of "digital skills for all" are described. The provided examples are related to the co-production of digital and inclusive public services for all as well as to the training of specific population's segments, including older people, migrants, youth with disabilities and NEETs (Neither in Employment nor in Education or Training), to make them digitally literate. Focusing on training, the following different target groups are addressed for diverse reasons (why) on partially similar contents (what) in different ways (how):

- **Older people**

One of the main risks for digitally unskilled older people is disconnected with severe implications for their civil and social relationships (why). Suppose they are not able to communicate with their digital devices. In that case, even well-educated older subjects are at risk to become isolated, unable to carry out everyday tasks such as online banking, interacting with official forms, and losing contacts with their families. Training addressing older people is mainly concerned with the fundamental notions of digital competence associated with communication (what), and some good practices are leveraged on "peer tutoring" where the tutor is the younger and the tutored the older (how). In this way, it is not only digital skills that are promoted but also the intergenerational link.

- **Migrants**

There are many reasons migrants need to be digitally competent, from searching for a job to requesting a document for accessing language courses (why). The ownership of basic digital skills related to information and communication (what) is crucial for them to be part of the country they reached. Language may be an obstacle in the digital training of migrant people: therefore, modelling and coaching (how) are essential strategies for effective training.

- **Youth with disabilities**

In general, ICT may increase the opportunities for young adults with disabilities to access training and learning, participate in a community of interest, and find jobs (why). For these purposes, they need to develop from basic to advanced digital competences (what), but a condition is required (how): the requirement of accessibility (primarily but not exclusively web-accessibility) must be met, thus ensuring that ICTs are enablers and not obstacles to the digital participation of these young adults. Again, modelling,

tutoring and coaching are crucial in supporting them to the point that they can become the protagonists of their digital environments as digital workers checking for web accessibility.

- **Youth at risk of social exclusion**.

For young people at risk of social exclusion, school and, more generally, the formal education system is far from providing them with relevant involvement in terms of their marginalisation (why). Exploring informal digital approaches with young adults as a starting point to bridging the formal and informal learning experiences (how) may be an effective strategy to promote digital competencies associated with information, communication and digital creativity (what).

2.2.2 Digital competencies for employability

The economy digitisation is contributing to the polarization of the labour market: on the one hand, it has led to an increased demand for high-skilled individuals, able to use the new technologies to carry out their professional tasks; on the other hand, it has led to a decreased need for low-skilled workers. Again, automation based on smart technologies replacing humans has resulted in some cases of jobs losses. At the same time, digitisation favours the emergence of new jobs requiring cognitive and interactive abilities complementary to computer-based work. Moreover, digitisation also leads to the transformation of existing jobs, reshaping the job tasks, and, consequently, the necessary skills to perform specific jobs.

Recent figures on digital skills and the labour market indicate the increasing mismatch between the digital skills needed on job demand and the digital skills currently available on the supply side. Furthermore, Eurostat data show how rapidly the employed internet users' job tasks are changing due to the evolution of the various software used in the workplace. The workers often had to learn how to use new equipment for their job, and some admitted to needing further training.

2.3 The digital skills required for the integration of the technology into the classes for adult education

The results of pedagogical reflections drawn up by various organizations are presented below.

2.3.1 Multilingual classification of European Skills, Competences, Qualifications and Occupations (ESCO) and DIGCOMP

ESCO is the multilingual classification of European Skills, Competences, Qualifications and Occupations. It is coordinated by DG Employment, Social Affairs and Inclusion, and supported by the European Centre for the Development of Vocational Training (Cedefop) and is an important part of the Europe 2020 strategy.

The ESCO classification identifies and categorises skills, competences, qualifications and occupations relevant for the EU labour market and education and training. It systematically shows the relationships between the different concepts.

An example of gap analysis to compare existing frameworks is the ESCO9 list of transversal ICT skills. DIGCOMP framework was used as one of the reference tools for gauging the competence areas and needed skills. DIGCOMP has itself taken advantage of this collaboration by adding some new concepts into its updated framework. The table below shows the five areas finally included in the list and the corresponding areas.

Table 6. The mapping of the DIGCOMP and ESCO competence areas

DIGCOMP	ESCO Transversal ICT skills
Information and data literacy	Digital data-processing
Communication and collaboration	Digital communication
Digital content creation	Content-creation with ICT software
Safety	ICT Safety
Problem-solving	Problem-solving with ICT tools and hardware

[9] https://ec.europa.eu/esco/

2.3.2 European e-Competence Framework (e-CF) and DIGCOMP

The e-Competence Framework (e-CF) is a common European framework for ICT Professionals in all sectors. To better understand the synergies between these two frameworks e-CF was also mapped with DIGCOMP. In this case, the main difference between the instruments is that one is for a general audience, i.e. DIGCOMP for citizens. In contrast, the e-CF framework is for professionals working in the ICT sector.

The advantage of mapping the two is to show the continuity of specific skills when passing from citizens' competencies to those expected of ICT professionals. The following table presents the entire list of cross-references.

Table 7. Cross-reference between DIGCOMP and e-CF

DigComp competence	*Nature of cross-reference*	e-CF competence
3.4 Programming	*could correspond with*	A.6 Application Design (EQF levels 3-6); B.1 Application Development (EQF levels 3- 8); B.6 Systems Engineering (EQF levels 6-7)
1.3 Storing and retrieving information	*higher levels could correspond with*	D.10 Information and Knowledge Management (EQF levels 6-8)
4.1 Protecting devices	*higher levels could correspond with*	D.1 Information Security Strategy Management (EQF levels 7-8); E.8 Information Security Management (EQF levels 5-7)
4.4 Protecting the environment	*higher levels could correspond with*	A.8 Sustainable Development (EQF levels 6-7)
5.1 Solving technical problems	*higher levels could correspond with*	C.4 Problem Management (EQF levels 4-7)
5.3 Innovating and creatively using technology	*higher levels could correspond with*	A.9 Innovating (EQF levels 7-8)
5.2 Identifying needs and technological responses	*higher levels could partially correspond with*	A.4 Product/Service Planning (EQF levels 4-7)
5.4 Identifying digital competence gaps	*higher levels could partially correspond with*	D.3 Education and Training Provision (EQF levels 4-6); D.9 Personnel Development (EQF levels 4-7)
2.6 Managing Digital Identity	*higher levels could partially correspond with*	E.3 Risk Management (EQF levels 4-7)
3.3 Copyright and Licences	*higher levels could partially correspond with*	D.8 Contract Management EQF levels 4-7) Note: many others also mention IPR as a knowledge example

2.3.3 DIGCOMP and UNESCO's Media and Information Literacy (MIL) framework

DIGCOMP was mapped to UNESCO's work on Media and Information Literacy[10], which brings together the fields of Information and Media literacy as "a combined set of competencies necessary for life and work today". JRC incorporated this perspective with the DIGCOMP 2.0 update, which encompasses the main components of Information Literacy and Media Literacy parts, as shown in the following table.

Table 8. Cross-reference between DIGCOMP and UNESCO's Media and Information Literacy

DIGCOMP Competences	Global Media and Information Literacy Assessment Framework "MIL Subject Matters"
Information and data literacy 1.1 Browsing, searching and filtering data, information and digital content 1.2 Evaluating data, information and digital content 1.3 Managing data, information and digital content	1.1. Definition and articulation of a need for information 1.2 Search and location of information and media content 1.3 Access to information, media content and media and information providers 1.4 Retrieval and holding/storage of information and media content 2.2 Assessment of information and media content, and media and information providers 2.3 Evaluation of information and media content, and media and information providers 2.4 Organisation of information and media 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 2.6 Managing digital identity	3.2 Communication of information, media content and knowledge ethically and effectively in an ethical and effective manner 3.3 Participating in societal-public activities as an active citizen 3.4 Monitoring influence of information, media content, knowledge production and use, as well as of media and information providers
Digital content creation 3.1 Developing digital content 3.2 Integrating and re-elaborating digital content 3.3 Copyright and licenses 3.4 Programming	3.1 Creation of knowledge and creative expression 3.2 Communication of information, media content and knowledge ethically and effectively in an ethical and effective manner
Safety 4.1 Protecting devices 4.2 Protecting personal data and privacy 4.3 Protecting health and well-being 4.4 Protecting the environment	

[10] UNESCO, Media and Information Literacy: http://www.unesco.org/new/en/communication-and-information/media-development/media-literacy/mil-as-composite-concept/

Problem-solving 5.1 Solving technical problems 5.2 Identifying needs and technological responses 5.3 Creatively using digital technologies 5.4 Identifying digital competence gaps	

2.3.4 ECDL/ICDL Framework and DIGCOMP mapping

ICDL[11] is an international organisation that benefits from the unique support of experts from national computer societies and education and training partners, local and regional authorities, national governments, international development organisations, as well as public and private sector employers in all sectors worldwide to develop vendor-independent digital competence standards in the workforce, education, and society. The Foundation provides certification in more than 100 countries, enabling individuals and organisations to assess, build, and certify their competence in using computers and digital tools to the globally-recognised European Computer Driving Licence (ECDL) standard, known as ICDL outside Europe.

The ECDL Foundation has been an active stakeholder in developing the DIGCOMP framework from its initial stages, sharing its expertise in defining, structuring, and assessing digital skills. The DIGCOMP framework is a general, high-level description of the set of competencies relevant to digital technology users. ECDL offers specific solutions in this area. ECDL has carried out an exercise of mapping the ICDL programme to DIGCOMP, which has been identified as an implementation example by the Joint Research Centre (JRC). ECDL modules were mapped both to DIGCOMP 1.0 and 2.0. JRC has reviewed these mappings and identified them as implementation examples of using the framework. ECDL certificates can be used as proof of acquired competence for various purposes, for instance, in the Europass CV (similarly to languages certificates that prove language levels indicated in the language grid). The mapping schema is presented in the following Figure.

[11] https://icdleurope.org/policy-and-publications/icdl-and-digcomp/

DigComp Area	DigComp Competences	ECDL Modules
Information and Data Literacy	Browsing, searching and filtering data, information and digital content Evaluating data, information and digital content Managing data, information and digital content	Computer Essentials Information Literacy
Communication and Collaboration	Interacting through digital technologies Sharing through digital technologies Engaging in citizenship through digital technologies Collaborating through digital technologies Netiquette Managing digital identity	Online Essentials Online Collaboration ICT in Education
Digital Content Creation	Developing digital content Integrating and re-elaborating digital content Copyright and licences Programming	Word Processing Spreadsheets Presentation Using Databases Advanced Word Processing Advanced Spreadsheets Web Editing Image Editing Project Planning 2D CAD Advanced Database Advanced Presentation
Safety	Protecting devices Protecting personal data and privacy Protecting health and well-being Protecting the environment	IT Security
Problem Solving	Solving technical problems Identifying needs and technological responses Creatively using digital technologies Identifying digital competence gaps	Computing ICT Troubleshooting* * Coming in 2017

Note: *Some modules may support more than one competence area - for example, Computing relates to Programming in Digital Content Creation, as well as Problem Solving; Computer Essentials and Online Essentials both include issues relating to Safety.*

Figure 14: ECDL and DIGICOMP competences mapping model[12]

[12] Source: https://icdleurope.org/policy-and-publications/icdl-and-digcomp/

2.4 Digital Competence Framework for Educators

The teaching professions face rapidly changing demands, which require a new, broader and more sophisticated set of competences than before. The ubiquity of digital devices and applications, in particular, requires educators to develop their digital competence.

Education institutions are currently facing the challenge of seeking to innovate ways of conducting their education work, especially in light of the recent technological, economic and social changes that are now taking place, with the aim of training and educating new generations for an uncertain and disconcerting future (OpenMind BBVA, 2017).

Within the professional competences of the teacher, different authors allude to those skills or abilities related to the use of technological tools for conducting their professional activity in the classroom, which is different in many aspects to the use that could be given to them in the household environment (Blau I. et alii,2017). Modern education requires the addition of technologies, which at the moment are digital. This demands that the teachers possess a significant Teachers Digital Competence (TDC) for the mastery of the ICT and their integration into the teaching and learning processes (Hatlevik O. E. et alii, 2018). This competence is understood as a set of capacities, abilities, knowledge or skills that teachers possess to solve educational problems by integrating ICT. At the same time, the TDC's mastery empowers the teacher for the use of the ICT not only as support for their existing practices but also to transform them (Uerz D. et alii, 2018).

Some factors considered to be mobilizing variables of the TDC are described below:

1. training of the teacher: the teacher's work experience, initial training and the degree of knowledge of the ICT tools are a fundamental factor for the development of TDC (Garzon Artacho E. et alii, 2020);
2. resources: quality of the infrastructure and availability of the digital devices and technologies necessary (Gil-Flores J. et alii, 2017). Some teachers assert their pre-disposition for integrating ICT resources into teaching-learning practices if they had the necessary means;
3. usage time: dedication to ICT usage in and out of the classroom as an element favouring the teacher's digital competence. Insufficient time available to prepare the Technology-enhanced learning (TEL) sessions through the is an opposing element (Aslan A. et alii, 2016);
4. attitude towards technology: the attitudes and beliefs the teacher has for the TEL opportunities are critical variables that will determine the addition of the ICT to the teaching practice of the teacher, and not only their addiction but also how they are introduced and the functions assigned to them (Ghomi M. et alii, 2019). This attitude is perceived in the teacher's use of certain technologies such as social networks (Scherer R. et alii, 2019).

For the acquisition of the teacher's digital competence, a series of competence frameworks have been suggested. All of these seek to discover how the technology should be integrated and used in teaching, identify the training needs, and propose to personalize training itineraries.

Furthermore, in agreement with different authors' comments, the following can be considered the most consolidated: (Please see the following table.)

Table 9. Teachers Digital Competence frameworks and models. Updated by Esteve (2015) and Lazaro (2015)

Model Framework	Institution	Reference	Areas or dimensions of TDC
ICT standards for FID	Ministry of Education, Chile	Enlaces (2008)	Pedagogical, technical, school management, social, ethical and legal aspects of development.
NETS-T	ISTE	ISTE (2008)	Learning and creativity of the students, learning and evaluation experiences, work, citizenship and professional growth.
Teachers ICT competence standards	UNESCO	Unesco (2008)	Policy and vision, curriculum and evaluation, pedagogy, ICT, organization and administration, professional teacher training.
Teachers ICT competencies	Ministry of Education, Chile	Enlaces (2011)	Pedagogical, technical, management, social, ethical and legal, and professional development.
DigiLit Leicester	Leicester City Council	Fraser, Atkins & Richard (2013)	Search, evaluation and organization, create and share, evaluation and feedback, communication, collaboration, and participation, security, identity, development.
ICT competences for professional teacher development	Ministry of National Education, Colombia	Ministerio Educación Nacional (2013)	Technological, communicative, pedagogical, management and research.
Common Framework for TDC	Ministry of Education, Government of Spain	INTEF (2014 y 2017)	Information, communication, content creation, security, problem-solving
TDC Rubric	ARGET, Universitat Rovira i Virgili	Lázaro & Gisbert (2015)	Didactic, curricular and methodological; planning, organization and management of digital technology resources and spaces; relational, ethical and security; personal and professional
TDC definition	Generalitat de Catalunya	Departament d'Ensenyament (2016)	Design, planning and didactic implementation; management of digital technology resources and spaces; communication and collaboration; ethics and digital citizenship; professional development
DIGCOMP-EDU	European Commission	Redecker & Punie (2017)	Social and professional commitment; digital resources; digital pedagogy; evaluation and feedback; empowerment of students; facilitate students' digital competence

Altogether, an evaluation study using expert competence highlighted the DigCompEdu model as the most adequate for evaluating the Teachers Digital Competence.

The European Framework for the Digital Competence of Educators (DigCompEdu) is a scientifically sound framework describing what it means for educators to be digitally competent. It provides a general reference frame to support the development of educator-specific digital competences in Europe. DigCompEdu is directed towards educators at all education levels, from early childhood to higher and adult education, including general and vocational education and training, special needs education, and non-formal learning contexts. It aims to provide an available reference frame for developers of Digital Competence models, i.e. the Member States, regional governments, relevant national and regional agencies, educational organisations themselves, and public or private professional training providers.
DigCompEdu considers six different competences areas with a total of 22 competences.

- area 1 focuses on the professional environment;
- area 2 on sourcing, creating and sharing digital resources;
- area 3 on managing and orchestrating the use of digital tools in teaching and learning;
- area 4 on digital devices and strategies to enhance assessment;
- area 5 on the use of digital tools to empower learners;
- area 6 on facilitating learners' digital competence.

Areas 2 to 5 form the educational core of the framework. They detail the competencies educators need to possess to foster effective, inclusive and innovative learning strategies using digital tools.

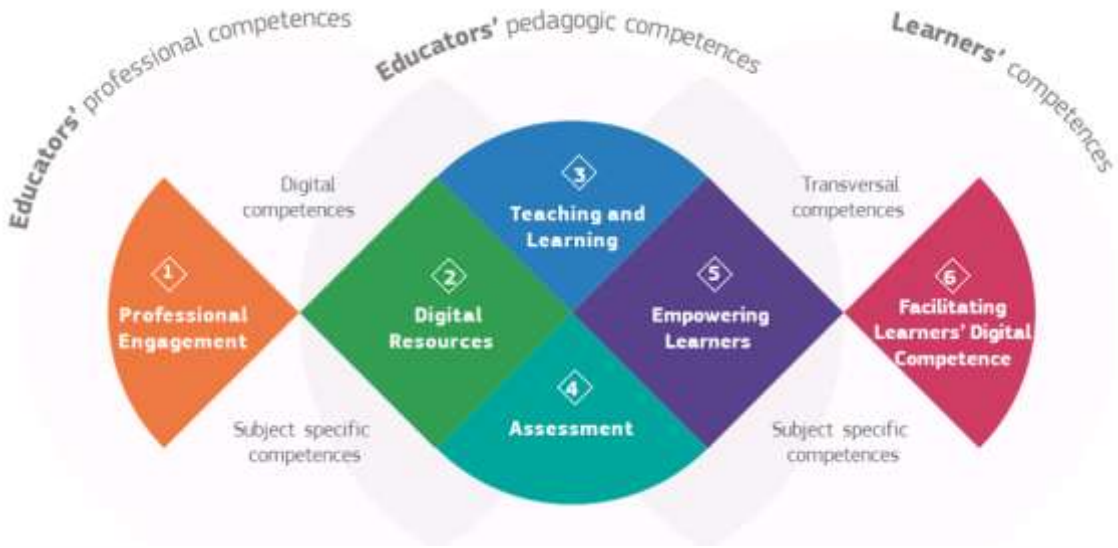


Figure 15. DigCompEdu[13] - competences areas

[13] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/european-framework-digital-competence-educators-digcompedu

To encourage take-up, it is proposed to refer to proficiency levels using motivating role descriptors. These can, however, be mapped onto the proficiency levels used by the Common European Framework of Reference for Languages (CEFR), ranging from A1 (Newcomer) to C2 (Pioneer). In general, the following characterisations apply:

- newcomers (A1) little experience and contact with education technology. Need continuous guidance to improve his or her digital competence level;
- explorers (A2) little contact with education technology. Have not developed specific strategies for including ICT in the classroom. Need external guidance to improve their digital competence level for teachers;
- integrators (B1) experiment with education technology and reflects on its adequacy for different educational contexts;
- experts (B2) utilize a wide range of educational technologies critically and with confidence and creativity. Seek the continued improvement of teaching practices;
- leaders (C1) rely on a broad repertoire of flexible, comprehensive and effective digital strategies. They can adapt their needs to different resources, processes and knowledge within their reach. A source of inspiration for others;
- pioneers (C2) question the adequacy of contemporary digital and pedagogical practices, of which they are experts. They lead the innovation of ICT and are a role model to follow for other educators.

The synthesis of the DigCompEdu Framework is presented in the following table:

Table 10. DigCompEdu competence descriptors

Competence Areas	Competencies' Description
1. Professional engagement	**1.1 Organisational communication** *To use digital technologies to enhance organisational communication with learners, parents and third parties. To contribute to collaboratively developing and improving organisational communication strategies.*
	1.2 Professional collaboration *To use digital technologies to engage in collaboration with other educators, sharing and exchanging knowledge and experiences and collaboratively innovating pedagogic practices.*
	1.3 Reflective practice *To individually reflect on, critically assess and actively develop one's own digital pedagogical practice and that of one's educational community.*
	1.4 Digital Continuous Professional Development (CPD) *To use digital sources and resources for continuous professional development.*
2. Digital Resources	**2.1 Selecting digital resources** *To identify, assess and select digital resources for teaching and learning. To consider the specific learning objective, context, pedagogical approach, and learner group, when selecting digital resources and*

	planning their use.
	2.2 Creating and modifying digital resources *To modify and build on existing openly-licensed resources and other resources where this is permitted. To create or cocreate new digital educational resources. To consider the specific learning objective, context, pedagogical approach, and learner group, when designing digital resources and planning their use.*
	2.3 Managing, protecting and sharing digital resources *To organise digital content and make it available to learners, parents and other educators. To effectively protect sensitive digital content. To respect privacy and copyright rules. To understand the use and creation of open licenses and open educational resources, including their proper attribution.*
3. Teaching and Learning	**3.1 Teaching** *To plan for and implement digital devices and resources into the teaching process, to enhance the effectiveness of teaching interventions. To appropriately manage and orchestrate digital teaching interventions. To experiment with and develop new formats and pedagogical methods for instruction.*
	3.2 Guidance *To use digital technologies and services to enhance the interaction with learners, individually and collectively, within and outside the learning session. To use digital technologies to offer timely and targeted guidance and assistance. To experiment with and develop new forms and formats for offering guidance and support.*
	3.3 Collaborative learning *To use digital technologies to foster and enhance learner collaboration. To enable learners to use digital technologies as part of collaborative assignments, as a means for enhancing communication and collaboration and for collaborative knowledge creation.*
	3.4 Self-regulated learning *To use digital technologies to support self-regulated learning processes, i.e. to enable learners to plan, monitor and reflect on their own learning, provide evidence of progress, share insights and come up with creative solutions.*
4. Assessment	**4.1 Assessment strategies** *To use digital technologies for formative and summative assessment. To enhance the diversity and suitability of assessment formats and approaches.*
	4.2 Analysing evidence *To generate, select, critically analyse and interpret digital evidence on learner activity, performance and progress, to inform teaching and learning.*
	4.3 Feedback and Planning *To use digital technologies to provide targeted and timely feedback to learners. To adapt teaching strategies accordingly and to provide targeted support, based on the evidence generated by the digital technologies used. To enable learners and parents to understand the evidence provided by digital technologies and use it for decision-making.*
5. Empowering Learners	5.1 Accessibility and inclusion *To ensure accessibility to learning resources and activities, for all learners, including those with special needs. To consider and respond to learners' (digital) expectations, abilities, uses and misconceptions, as well as contextual, physical or cognitive constraints to their use of digital technologies.*
	5.2 Differentiation and personalisation

	To use digital technologies to address learners' diverse learning needs, by allowing learners to advance at different levels and speeds, follow individual learning pathways and goals.
	5.3 Actively engaging learners *To use digital technologies to foster learners' active and creative engagement with a subject matter. To use digital technologies within pedagogic strategies that foster learners' transversal skills, open learning to new, real-world contexts, involve learners themselves in hands-on activities, scientific investigation and complex problem solving, or in other ways that increase learners' active engagement and creative expression.*
6. Facilitating Learners' Digital Competence	**6.1 Information and media literacy** *To incorporate learning activities, assignments and assessments which require learners to articulate information needs; to find information and resources in digital environments; to organise, process, analyse and interpret information; and to compare and critically evaluate the credibility and reliability of information and its sources*
	6.2 Digital communication & collaboration *To incorporate learning activities, assignments and assessments which require learners to effectively and responsibly use digital technologies for communication, collaboration and civic participation.*
	6.3 Digital content creation *To incorporate assignments and learning activities that require learners to express themselves through digital means, and to modify and create digital content in different formats. To teach learners how copyright and licenses apply to digital content, how to reference sources and attribute licenses.*
	6.4. Responsible use *To take measures to ensure learners' physical, psychological and social wellbeing while using digital technologies. To empower learners to manage risks and use digital technologies safely and responsibly.*
	6.5 Digital problem solving *To incorporate learning and assessment activities that require learners to identify and solve technical problems or to transfer technological knowledge creatively to new situations.*

The fact that the DigComp framework is being constantly updated shows the dynamic nature of this competence: since ICTs are continuously changing, what must be learned about the digital landscape is continuously transforming. Therefore, being a digitally competent individual is a moving target for citizens requiring cognitive flexibility and openness towards change. A key message from this for adults' trainers in the field is that, rather than focussing on merely technical knowledge or specific IT tools, which risk becoming rapidly obsolete, trainers should encourage learners to approach "the machine" by trial and error stimulating exploratory attitudes, abductive abilities and problem-solving skills.

As for the exploratory attitudes, the trainers should encourage the trainees to approach the new software and/or digital interfaces with curiosity, looking around the screen, trying and testing, formulating hypotheses on the functions associated with the icons. Therefore, rather than stressing the need for memorising technical procedures – which is also challenging, especially for older people, trainers should encourage trial-and-error learning processes, where making mistakes is not a shame but a productive way to reflect on the causes of the error while being successful may generate new good practices.

Trainers should also promote abductive processes of making inferences related to the elaboration of information found on the web. While browsing the web is not a linear process, serendipity is the main feature of how we access online resources. This involves a positive attitude towards the unknown or also a pleasure for random discoveries. But to make sense of unexpected discoveries, the ability to carry on abductive inferences becomes crucial. Thinking of the web, the navigation experience from one Internet source to another requires users to develop the ability to generate new meanings in the expansive landscape of the networked digital complexity.

Finally, in the face of the digital world's several challenges, trainers should support the development of problem-solving skills associated with the use of technologies. Problem-solving skills could be considered from the following two important aspects: on one side, they are meant as the capacity of solving technological issues; on the other side, they refer to the ability to propose technical solutions for the problems of everyday life. Both aspects are identified in the DIGCOMP framework. The problem-solving skills associated with digital technologies include solving technical problems from trouble-shooting to solving more complex issues; identifying needs and technological responses through the critical evaluation of possible solutions; creatively using technology for multimedia production; and expressing oneself. Learning by making approaches are recommended to promote this type of skill and digital media offers several opportunities to engage adult learners in the creative process of multimedia production. Making an artefact such as the multimedia resume, which was the aim of the previously mentioned Links-up workshop, allows trainees to get involved in learning by doing activities requiring learners to confront technical challenges and be creative and express themselves.

In conclusion, digital competence has to do with technologies and – and mainly – with crucial skills for lifelong learning processes. By promoting trial-and-error learning processes, uncertainty and abductive reasoning, and learning by doing, trainers may encourage adult learners to improve their digital competences both for active citizenship and as a means for continuous professional development and learning.

2.5 Mapping of digital skills identified for the integration of the technology in the classes for adult education in partner countries

In the following paragraphs, the survey results will show the primary skills needed to integrate technology in adult education classes in partner countries.

2.5.1 Italy

The Italian analysis registered that the absolute majority (96.6%) do use digital tools during teaching activities. The tools specified are as follows:

- interactive whiteboard, PC and smartphone;
- netbook;
- graphics pen and tablet;
- Video projector;
- Google apps;
- specific software inherent to a matter;
- internet, YouTube, WhatsApp;
- G Suite platform;
- digital books, e-books.

The teachers claim that their digital skills are functional to carry out the following activities:

- to use digital technologies to enhance organisational communication with learners;
- to use online training opportunities, e.g. video tutorials, MOOCs, webinars etc.;
- to share resources on online platforms or personal or organisational websites/blogs;
- to assess the usefulness of digital resources in addressing the learning objective, competence levels;
- to formulate appropriate search strategies to identify digital resources for teaching and learning;
- to create new digital educational resources;
- to use classroom technologies to support instruction, e.g. electronic whiteboards, mobile devices;
- to structure the lesson, so that different (teacher-led and learner-led) digital activities jointly reinforce the learning objective;
- to use digital assessment tools to monitor the learning process and obtain information on learners' progress;

- to use digital technologies to enhance formative assessment strategies, e.g. using classroom response systems, quizzes, games;
- to use digital technologies to strengthen summative assessment in tests, e.g. through computer-based tests, implementing audio or video (e.g. in language learning), using simulations or subject-specific digital technologies as test environments;
- to provide equitable access to appropriate digital technologies and resources, e.g. ensuring that all students have access to the digital technologies used.

To empowering learners, the teachers have been expressed the need to provide equitable access to appropriate digital technologies and resources, e.g. ensuring that all students have access to the digital technologies used.

To facilitate learners' digital competence area, the respondents have been expressed the need to create new, original and relevant content and knowledge and edit digital content in different formats.

Table 11. Summary of the skills selected with the corresponding areas.

Area	Skills
Professional development and reflective practice	• *To use digital technologies to enhance organisational communication with learners.* • *To use digital technologies to develop educational resources collaboratively.* • *To use the internet to update one's subjects specific competences.* • *To use online training opportunities, e.g. video tutorials, MOOCs, webinars etc.*
Digital resources	• *To formulate appropriate search strategies to identify digital resources for teaching and learning.* • *To assess the usefulness of digital resources in addressing the learning objective, competence levels.* • *To create new digital educational resources.* • *To share resources on online platforms or personal or organisational websites/blogs.*
Teaching and learning	• *To use classroom technologies to support instruction, e.g. electronic whiteboards, mobile devices.* • *To interact with learners in collaborative digital environments.* • *To structure the lesson, different (teacher-led and learner-led), digital activities reinforce the learning objective.*
Assessment	• *To use digital assessment tools to monitor the learning process and obtain information on learners' progress.* • *To use digital technologies to enhance formative assessment strategies, e.g. using classroom response systems, quizzes, games.* • *To use digital technologies to enhance summative assessment in tests, e.g., computer-based tests, implementing audio or video (e.g. in language learning), using simulations or subject-specific digital technologies as test environments.*

Empowering learners	• *To provide equitable access to appropriate digital technologies and resources, e.g. ensuring that all students have access to the digital technologies used.* • *To use digital technologies to visualise and explain new concepts in a motivating and engaging way, e.g. by employing animations or videos.*
Facilitating learners' digital competence	• *To create and edit digital content in different formats.* • *To create new, original and relevant content and knowledge.* • *To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.*

2.5.2 Bulgaria

The Bulgarian analysis has been registered that the absolute majority (88%) use digital tools during teaching activities. As the results show, results show that the use of a digital device is pre-defined by the learning objective to be reached.

Therefore, the tools specified are as follows:

- computer, tablets;
- electronic tests. electronic platforms and applications;
- multimedia, electronic modules, measuring instruments;
- Google Tools;
- simulation software products;
- electronic textbooks, quizzes, videos;
- specific software interactive tools, digital resources;
- learning platforms.

The teachers claim that their digital skills are functional to carry out the following activities:

- to seek targeted training and use opportunities for continuous professional development;
- to use digital technologies to enhance organisational communication with learners;
- to use online training opportunities, e.g. video tutorials, MOOCs, webinars, etc.;
- to create new digital educational resources;
- to formulate appropriate search strategies to identify digital resources for teaching and learning;
- to respect possible copyright restrictions to using, re-using and modifying digital resources;
- to use classroom technologies to support instruction, e.g. electronic whiteboards, mobile devices;
- to structure and manage content, collaboration and interaction in a digital environment
- to consider how educator-led digital interventions – whether face-to-face or in a digital environment - can best support the learning objective;
- to use digital technologies to enable learners to reflect on and self-assess their learning process.
- to use digital technology to grade and give feedback on electronically submitted assignments;
- to use digital assessment tools to monitor the learning process and obtain information on learners' progress;
- to use digital technologies to enhance summative assessment in tests, e.g. through computer-based tests, implementing audio or video (e.g. in language learning), using simulations or subject-specific digital technologies as test environments;

To empowering learners, the teachers have been expressed the need to:

- provide equitable access to appropriate digital technologies and resources, e.g. ensuring that all students have access to the digital technologies used;
- select appropriate digital technologies for fostering active learning in a given learning context or for a specific learning objective;
- employ design principles for increasing accessibility for the resources and digital environments used in teaching;
- use digital technologies to visualise and explain new concepts in a motivating and engaging way, e.g. by employing animations or videos.

The respondents have been expressed the need to: create new, original and relevant content and knowledge; create and edit digital content in different formats; plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.

Table 12. Summary of the skills selected with the corresponding areas.

Area	Skills
Professional development and reflective practice	• *To use online training opportunities, e.g. video tutorials, MOOCs, webinars etc.* • *To seek targeted training and use opportunities for continuous professional development.* • *To use digital technologies to enhance organisational communication with learners.*
Digital resources	• *To formulate appropriate search strategies to identify digital resources for teaching and learning.* • *To create new digital educational resources.*
Teaching and learning	• *To use classroom technologies to support instruction, e.g. electronic whiteboards, mobile devices.*
Assessment	• *To use digital assessment tools to monitor the learning process and obtain information on learners' progress.* • *To use digital technologies to enhance summative assessment in tests, e.g., computer-based tests, implementing audio or video (e.g. in language learning), using simulations or subject-specific digital technologies as test environments.* • *To use digital technology to grade and give feedback on electronically submitted assignments.*
Empowering learners	• *To provide equitable access to appropriate digital technologies and resources, e.g. ensuring that all students have access to the digital technologies used.* • *To select appropriate digital technologies for fostering active learning in a given learning context or for a specific learning objective.*
Facilitating learners' digital competence	• *To create and edit digital content in different formats.* • *To create new, original and relevant content and knowledge.* • *To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.*

2.5.3 Romania

The Romanian analysis has been registered that all respondents do use digital tools during teaching activities. As the results show, the use of a digital device is pre-defined by the learning objective to be reached.

Therefore, the tools specified are as follows:

- computers, tablets, smartphones;
- video projector;
- digital resources;
- electronic platforms;
- learning platforms;
- Google apps, Google classroom, Zoom;
- internet, YouTube, WhatsApp;
- G Suite platform;
- digital books, e-books.

The teachers claim that their digital skills are functional to carry out the following activities:

- to use online training opportunities, e.g. video tutorials, MOOCs, webinars etc.;
- to seek targeted training and exploit opportunities for continuous professional development;
- to combine and mix existing digital resources or parts thereof, where this is permitted;
- to assess the usefulness of digital resources in addressing the learning objective, competence levels;
- to use classroom technologies to support instruction, e.g. electronic whiteboards, mobile devices;
- to set up learning sessions, activities and interactions in a digital environment;
- to use digital assessment tools to monitor the learning process and obtain information on learners' progress;
- to use digital technologies to enhance summative assessment in tests, e.g. through computer-based tests, implementing audio or video (e.g. in language learning), using simulations or subject-specific digital technologies as test environments.

To empowering learners, the teachers have been expressed the need to:

- provide equitable access to appropriate digital technologies and resources, e.g. ensuring that all students have access to the digital technologies used;
- use digital technologies to visualise and explain new concepts in a motivating and engaging way, e.g. by employing animations or videos.

The respondents have been expressed the need to: create: new, original and relevant content and knowledge and edit digital content in different formats.

Table 13. Summary of the skills selected with the corresponding areas.

Area	Skills
Professional development and reflective practice	• *To use online training opportunities, e.g. video tutorials, MOOCs, webinars etc.* • *To use digital technologies to enhance organisational communication with learners.* • *To seek targeted training and use opportunities for continuous professional development*
Digital resources	• *To assess the usefulness of digital resources in addressing the learning objective, competence levels.* • *To combine and mix existing digital resources or parts thereof, where this is permitted.* • *To modify and edit existing digital resources where this is permitted.*
Teaching and learning	• *To use classroom technologies to support instruction, e.g. electronic whiteboards, mobile devices.* • *To set up learning sessions, activities and interactions in a digital environment.* • *To structure and manage content, collaboration and interaction in a digital environment.*
Assessment	• *To use digital assessment tools to monitor the learning process and obtain information on learners' progress.* • *To use digital technologies to enhance summative assessment in tests, e.g., computer-based tests, implementing audio or video (e.g. in language learning), using simulations or subject-specific digital technologies as test environments.* • *To use digital technologies to scaffold learners' assignments and their assessment, e.g. through ePortfolios.*
Empowering learners	• *To provide equitable access to appropriate digital technologies and resources, e.g. ensuring that all students have access to the digital technologies used.* • *To employ digital technologies and strategies, e.g. assistive technologies, designed for learners' in need of exceptional support (e.g. learners with physical or mental constraints; learners with learning disorders).* • *To use digital technologies to visualise and explain new concepts in a motivating and engaging way, e.g. by employing animations or videos.* • *To employ digital learning environments or activities that are motivating and engaging, e.g. games, quizzes.*
Facilitating learners' digital competence	• *To create and edit digital content in different formats.* • *To create new, original and relevant content and knowledge.*

2.5.4 Spain

The Spanish analysis has been registered that all respondents do use digital tools during teaching activities. The data deriving from these surveys to our teachers expose the following assessments and needs:

- there is a demand for training, both for teachers and students, to use and manage new technologies, plan classes, create motivating online materials, or carry out the teaching and learning process in online and face-to-face courses. Besides, we consider that they are an essential means to be able to function in the world we live in and thus to access all kinds of knowledge;
- regarding “soft” skills, critical thinking, and effective communication have been selected as the most significant ones. On the one hand, we consider crucial consideration as necessary when selecting information according to the searches that students carry out and the messages they emit or receive or the applications or websites they visit. On the other hand, effective communication is also essential for students to have alternative means to communicate their results by written means, using programs such as word processor, interpretation of information in Excel tables or slide show documents in PowerPoint. Work is done gradually following the students' progress in the use of ICT and their own language, since the students are very heterogeneous academically, in language competence, and in their age (the range varies from 18 and 90 years). Besides, effective communication not only allows student communication with their peers and with teachers to be quick and effective but also facilitates communication and coordination between teachers;
- a common difficulty encountered by teachers is the online correction of student’s tasks and the return time of such correction, as well as the lack of a link between teachers and students, thus resulting in a very impersonal correction process;
- on the other hand, from our perspective, there is a relevant deficiency in the reduced use of digital identity (digital certificate, electronic ID, etc.), manifested by adult students, as a general rule. This acquires special relevance in individuals' relationship with administrations, especially in a historical moment in which face-to-face access can be a difficulty. In this sense, we consider relevant implementation by the administrations of digital identity as a mechanism of access to any procedure or information related to the individual.

After researching at the state level, it is easy to see that, in adult education, we frequently find the mistaken idea that making basic use of digital devices is equivalent to having a genuine digital culture. Thus, it is common for students to have skills in the use of a specific tool and, however, it does not control the knowledge that would allow them to handle other similar means or make the leap to other ones that may be related. For example, they often present difficulties in identifying the different formats that a file may have according to its category (text, spreadsheet, image, video, sound, etc.), format conversion procedures,

understanding the processes for the transfer to/from the cloud to local devices (mobile, tablet, computer), the concept of attachments, compression/decompression, etc. This, particularly in adult education, is due to the high percentage of self-taught people. That is why joining a regulated, and systematic training procedure helps them clarify, plan, and expand their digital skills.

The teachers claim that their digital skills are functional to carry out the following activities:

- to use digital technologies to enhance organisational communication with learners;
- to seek targeted training and exploit opportunities for continuous professional development;
- to use online training opportunities, e.g. video tutorials, MOOCs, webinars etc.;
- to formulate appropriate search strategies to identify digital resources for teaching and learning;
- to modify and edit existing digital resources where it is permitted;
- to use classroom technologies to support instruction, e.g. electronic whiteboards, mobile devices;
- to set up learning sessions, activities and interactions in a digital environment;
- to use digital assessment tools to monitor the learning process and obtain information on learners' progress;
- to use digital technologies to enhance formative assessment, e.g. using classroom response systems, quizzes, games.

To empowering learners, the teachers have been expressed the need to:

- provide equitable access to appropriate digital technologies and resources, e.g. ensuring that all students have access to the digital technologies used;
- use digital technologies to visualise and explain new concepts in a motivating and engaging way, e.g. by employing animations or videos.

The respondents have been expressed the need to: create and edit digital content in different formats.
The summary of the skills selected with the corresponding areas in the following table.

Table 14. Summary of the skills selected with the corresponding areas.

Area	Skills
Professional development and reflective practice	• *To use online training opportunities, e.g. video tutorials, MOOCs, webinars etc.* • *To use digital technologies to enhance organisational communication with learners.* • *To seek targeted training and use opportunities for continuous professional development*
Digital resources	• *To formulate appropriate search strategies to identify digital resources for teaching and learning.* • *To assess the usefulness of digital resources in addressing the learning objective, competence levels.* • *To combine and mix existing digital resources or parts thereof, where this is permitted.* • *To modify and edit existing digital resources where this is permitted.* • *To create new digital educational resources.*
Teaching and learning	• *To use classroom technologies to support instruction, e.g. electronic whiteboards, mobile devices.* • *To set up learning sessions, activities and interactions in a digital environment.* • *To structure the lesson, so that different (teacher-led and learner-led) digital activities jointly reinforce the learning objective.*
Assessment	• *To use digital assessment tools to monitor the learning process and obtain information on learners' progress.* • *To use digital technologies to enhance formative assessment strategies, e.g. using classroom response systems, quizzes, games.*
Empowering learners	• *To provide equitable access to appropriate digital technologies and resources, e.g. ensuring that all students have access to the digital technologies used.* • *To use digital technologies to visualise and explain new concepts in a motivating and engaging way, e.g. by employing animations or videos.* • *To employ digital learning environments or activities that are motivating and engaging, e.g. games, quizzes.*
Facilitating learners' digital competence	• *To create and edit digital content in different formats.* • *To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.*

3. ANALYZING AND COMPARING OF THE ASSESSMENT AND EVALUATION SYSTEMS IN DISTANCE LEARNING THROUGH SPECIFIC TOOLS AND TECHNIQUES

Evaluation is the process through which "value" is attributed to an object, action or event. This is the activity with which people (individuals or groups, communities or institutions) express a judgment regarding a relevant and significant fact. The evaluation favours the awareness concerning both the changes to be taken and the goals to be achieved (Laneve C., 2011).

Alberto Parola e Roberto Trinchero (Parola, A. et alii, 2006) suggested three evaluation typologies:

- *satisfaction's evaluation* – the interest's degree aroused by an activity including the learners' willingness to repeat it measured, usually, through questionnaires, focus groups and structured observations based on a reference checklist;
- *learning assessment* – it measures achieved learning's level by the students. In this case, an educator has clearly defined the criteria for evaluating performance and competence by using, usually, rubrics. The selected criteria can be shared with the students so that everyone knows the evaluation system for a continuous improvement of their performances;
- *change's evaluation* – learners through media education acquire technical skills and actual competence and critical thinking by favouring changes in their attitudes and perspectives on surrounding reality and the world vision. In this case, the tools used are often exploratory questionnaires, including open-ending questions to be administered before and after the actions were foreseen, essays, themed drawings, logbooks and self-assessments. The aim is to allow learners to reflect and re-constructing their experience critically by working at the metacognitive level.

In this context, learning path's evaluation can be considered as **the process where an observed situation is compared with the one expected** to define meaning and value by comparing their results. In this context, the learning path's evaluation can be considered a process where an observed situation is compared with the one expected to define meaning and value by comparing their results. On the base of these last, more effective operational decisions on evaluation actions will be made.

While the typical situation is defined by the learning path objectives, which guide its planning, the observed situation is determined by the target group's collected data at a specific time. Both the expected and observed situations refer to particular features to be assessed.

Also, **if the evaluation is meant as verification**, it is not connected to the learning process, and its role is to report and certify the path carried out. Therefore, it is based on extrinsic motivation (e.g. grade), based on static knowledge and less predictive on what "students able to do with what they know".

On the other hand, if the **evaluation is meant as "development"**, it refers strictly to the training experience and promotes the learning experience's personalisation and specificity. Students tackle complex or open-problem tasks to improve their mastery in knowledge, in active processing of a specific context, in the use of their resources by involving the cognitive, emotional and social dimensions

3.1 Evaluation approaches' overview

The following table offers a brief description of some approaches used in the media's learning evaluation process to provide the project team with a guide. There is no single approach or method that can effectively satisfy all evaluation needs.

These different approaches were identified by Damiano Felini and Roberto Trinchero, as described in the following tables (Felini D. et alii, 2015).

In an **ex-ante evaluation** (initial one), the focus is on the expected situation, such as the objectives and the actions to pursue them.

Table 15. Features of ex-ante evaluation

Information to be collected	Possible evaluation actions, techniques and tools
Is the project complete and clear for all the actors involved?	Review and verification by the project team through focus groups.
Are the project objectives relevant to the target groups addressed?	Review by a representative subset of the target groups and their contacts (such as pupils, families, teachers, school managers) by using focus groups.
Among the possible projects, is this the best one about the goals, available resources and context?	Brainstorming with a representative subset of the target groups to carry out a SWOT (Strengths, Weakness, Opportunity, Threat) analysis to identify strengths, weaknesses, opportunities and risks regarding the project.

In the **goal-based evaluation** (Tyler R. W., 1942), the focus is on comparing the observed and the expected situation describing in terms of specific objectives to be achieved by the people involved.

If the evaluation refers to a single individual, its objectives are expressed in terms of behaviour, choices, attitudes, knowledge, skills and competences.

On the other hand, if the evaluation concerns the training, its objectives are expressed in terms of the participants' satisfaction, the achieved learning, changes and impact on the organization where the participants belong.

Table 16. Features of goal-based evaluation

Information to be collected	Possible evaluation actions, techniques and tools
Has the training been approved by the participants and other people involved (e.g. families, school manager, etc.)?	Satisfaction questionnaire administered to the participants and other people involved.
Has the training ensured learning in the participants? Have the established learning objectives been achieved?	Investigation on knowledge, skills, competencies, objectives before and after the training using structured, semi-structured and low-structured tests. Achieved progress definition.
Has the training changed the current practices in reading, writing, delivery and media critical thinking? Have people changed goals to be achieved?	Investigation on behaviour, choices, attitudes regarding reading, writing, delivery and media critical thinking practices before and after the training and determination of the obtained changes by using: a) questionnaires with questions about behaviour, choices, attitudes; b) structured or semi-structured observation of participants' behaviour in situations in which reading, writing, delivery and media critical thinking should emerge; c) logbook and retrospective analysis of their practices. Systematic investigation of the same practices after a while to verify the newly acquired methods maintaining.
Has the training affected the organization where the participants belong (e.g. class, school)? Have the objectives set by the organization for their members been achieved with the practice?	Interview (semi-structured or in-depth) with organisation's managers (e.g., class teachers, school managers) before the training to investigate the organization expectations and periodic interviews carried out after the action to verify their reaching.

In the **goal-free evaluation**, the focus is on the observed situation, e.g. on the objectives and the actions to reach them. The aim is to describe the real effects produced by the training and not achieve the fixed goals. The survey is mainly based on low-structured techniques (e.g. informal interviews, in-depth interviews, life stories, experiential observation). It aims to identify both negative and positive effects of the training.

Table 17. Features of goal-free evaluation

Information to be collected	Possible evaluation actions, techniques and tools
What are the effects produced by the training? Which are the expected and unexpected effects?	Investigation on knowledge, skills, reading, writing, delivery and media critical thinking, not strictly bounded to the fixed objectives through questionnaires, focus groups, interviews and observations.
What has changed in the participants and the community during and after the training?	Portfolio - a collection of the products developed by the participants during the training.

In the **responsive evaluation** (Stake R. E., 1975), the focus is on interests, problems, needs, questions. According to Stake's theory, the programmes or activities are evaluated different exhibit constituencies, stakeholders with different expectations, values, and value positions. The evaluator is in an excellent place to illustrate these differences without pressing for a consensus.

Table 18. Feature of the responsive evaluation

Information to be collected	Possible evaluation actions, techniques and tools
Which are the issues of the stakeholders?	Investigation of the most significant number of relevant issues regarding careers by using interviews.
What type of training's representations have the stakeholders developed?	Reflection on the training and experiences by using interviews with the participants involved.
What is the value of the training for the stakeholders?	Report based on the narrative documentation of the training by using text/video. It summarizes the whole experience by combining statements, anecdotes, photographs, audio-video clips.

In the **judgment-oriented evaluation** (Patton M. Q.,2011), the focus is on the value judgment about the training and its outcomes. One or more external experts conduct the assessment. It is based on applying their professional expertise in observing the specific elements of the training using the criteria previously set.

Table 19. Features of judgment-oriented evaluation

Information to be collected	Possible evaluation actions, techniques and tools
Has the training been conducted following the quality criteria?	Analysis of the training protocols and comparison with a set of quality criteria. Analysis of documents produced by stakeholders.
Has the training led the participants to build quality products?	Analysis of the participants' media products and the formulation of an evaluative judgment.

In the **adversary-judicial evaluation** (Wolf R. L., 1979), the focus is on the value judgment on the observed situation and the results from the comparison between observed and expected cases. The aim is to have a “positive judgment” and a “negative judgement” by internal and external experts.

Table 20. Features of adversary-judicial evaluation

Information to be collected	Possible evaluation actions, techniques and tools
What are the reasons supporting both "positive" and “negative" opinions on training?	A survey using a self-completed questionnaire to establish both the strengths and weaknesses. Focus groups with stakeholders to share their opinions. Identification and interviews of the relevant witnesses.
What is the final assessment of the training coming from this analysis?	Analysis and interpretation of both favourite and unfavourite elements.

Empowerment evaluation (Fetterman D. M., 2001) is a stakeholder involvement approach designed to provide groups with the tools and knowledge they need to monitor and evaluate their performance and accomplish their goals. It is also used to help groups achieve their goals. Empowerment evaluation focuses

on fostering self-determination and sustainability. It is particularly suited to the evaluation of comprehensive community–based initiatives or place-based initiatives.

Table 21. Features of empowerment evaluation

Information to be collected	Possible evaluation actions, techniques and tools
What are the critical issues emerging? How to overcome them?	Analysis of critical issues using focus groups with stakeholders. Strategies development to overcome them.
What are the personal and organisational improvement's areas that emerged during training? How exploit them?	Brainstorming with stakeholders. SWOT analysis to identify the improvement areas. Scenarios development on what could happen if the needed training.

The **decision-oriented evaluation** (Stufflebeam D. L., 1973) is a decision-based type of the assessment. Its focus is on the in- tended use of evaluation to inform decision-making. Patton defines it as "a process for making decisions and focusing an evaluation on the intended use by intended users" (Patton, 1994, p. 317). The information obtained from the evaluative process allows deciding on possible solutions to specific problems related to the context where the training is implemented.

The client-decision makers (e.g. the project funder or the organization's manager) have an essential role in the evaluation process because they define the criteria and the relevant elements to be considered appropriate in the evaluation. The evaluation consists of collecting data about both advantages and disadvantages of every possible decision so that the decision-maker can establish the best alternative.

Table 22. Decision-oriented evaluation

Information to be collected	Possible evaluation actions, techniques and tools
What are the possible decisions useful to solve problems relating to the context where the training took place?	Evaluation data collection regarding knowledge, skills, reading and writing competencies, delivery and media critical thinking with tests, and the impact of the training on the context with questionnaires or focus groups. Investigation on behaviour, choices, attitudes regarding reading, writing, use and media critical thinking by using questionnaires. Brainstorming with stakeholders to identify possible decision-making opportunities based on the evaluation data collected.
What is the best option for a specific context and situation?	Focus groups with the stakeholders' representatives to define both advantages and disadvantages for every option related to the organizations, structures, target groups. SWOT analysis for every option. Options' hierarchy from the best to the worst. Possible scenarios' construction for every option's application.

Brinkerhoff's **success case method** (Brinkerhoff R., 2003) in the **evaluation process** involves identifying the most and most minor successful cases within your learning program and studying them in detail. By

comparing the successes to the failures, people learn what to change to ensure success in future endeavours.

A training initiative can hardly bring all participants to the same grade of success: the involvement level in the topics and the activities can be different and lead them to different results.

Table 23. Evaluation based on the success case method

Information to be collected	Possible evaluation actions, techniques and tools
Who has benefited the most from the training path? What are the benefits obtained?	Investigation on knowledge, skills, reading and writing competencies, use and media critical thinking with tests and questionnaires. Investigation on the impact of the training on the context by using questionnaires or focus groups.
How has the proposed training promoted these benefits?	Interviews with the selected participants to tell about their training experience, highlighting, in their opinion, both the strengths and opportunities to be exploited. Evaluation report based on the story about their experience (e.g. text, video) by using, for example, statements, anecdotes, photos, audio-video clips.

3.2 Critical issues in the media's learning evaluation

In the evaluation modality to implement during a learning path, there are two issues to be considered: the learners' ability to use what they know in new situations and their commitment, interest and motivation levels shown.

It's crucial to distinguish between formative and summative assessment, two ways to evaluate students' learning. The first is related to the **formative assessment** used to monitor students' learning to provide ongoing feedback that instructors or teachers can use to improve their teaching and students' learning. The second one, **summative assessment**, is used to evaluate student's education at the end of an instructional unit by comparing it against some standard or benchmark.

The role of the evaluation is to regulate the learning process and not be only addressed its objectives.

With the mastery learning approach, the formative assessment gained a central role to create schools offering the same opportunities to all students. Still, with the introduction of the competency-based teaching approach, the aim is to assess skills through authentic and actual tasks.

In this context, a **holistic approach** to the assessment methods is preferred, which include the following features:

- meaningful tasks;
- learners' participation in the evaluation process;
- self-assessment;
- metacognitive skills' promotion;

- attention to the emotional and social aspects.

The evaluation should use tools that can guarantee reliability and transparency of the whole process. This means the tests should promote critical thinking, including different sources of knowledge and research, while the judgment should be reliable by adopting the following characteristics:

- performance observation from different perspectives;
- different settings and times;
- several expert evaluators;
- known and agreed criteria or reference standards.

The consequences coming from the holistic approach application are as follows:

- learning products are not considered exclusively in terms of final performance;
- the interrelation between learning products and processes: strategies, planning, monitoring, observation techniques;
- role of learning environments that can no longer be separated from teaching activities.

To understand **IF** and **HOW** students can perform a specific task, the easiest act would be to ask them to perform it and then to assess the quality of their performance, meant as the actions or processes to be evaluated through the carrying out or accomplishing of action, task, or function.
Table 24 shows the main differences between a traditional and holistic evaluation approach.

Table 24. The main differences between a traditional and holistic evaluation approach

Activity	"Traditional" approach	Holistic approach
Evaluation activities	Selection of correct answers.	Carrying out a task/performance
Nature of the activity	Constructed activity (artificial)	activity from a real context
Cognitive level	Knowledge/understanding	Application/analysis/synthesis
Solution development	Teacher-centred (pre-planned solution)	Student-centred (non-unique solution)
The objectivity of the score	Easily achieved (based on the amount of knowledge possessed)	Difficult to reach (based on learning's quality)
Evidence of the acquired competences	Indirect	Direct

Also, in the performance evaluation design, it is necessary to reflect on self-assessment practices, repeated tests on the core-abilities to measure learning growth, structured written exercises, holistic and integrated

contextualized activities, feedback on performance, portfolio, different levels of success, rubric, and to share the evaluation criteria with students favouring self-regulated learning.

3.3 Rubric as an evaluation tool

The rubric evaluation system's cultural background is the movement of the authentic assessment born in the Anglo-Saxon context in reaction to the massive use of the test as the primary tool for measuring the learning level. A rubric is an assessment tool that describes the expected performance for each criterion to achieve a grade or specific outcomes. A rubric is a systematic method to collect data regarding knowledge and skills. The rubric aims to make the tools more effective and bring the practice of assessing in the classroom closer to the learners' real learning needs. It defines the criteria used to evaluate a specific object (product, performance, process, competence). For example, to assess the quality of a class-group work, it can be used a rubric, including a checklist (list of questions allowing to observe what is required in a product or performance).

The evaluation rubric allows the competence description about the expectations (social, regulatory, disciplinary) and the specificity of the context and students (group or individuals). It is the result of a process focusing on teacher's competence and requiring to:

- make a synthesis between the norm/discipline and the specific context;
- accurately describe the observable features.

It constitutes the essential connection between the problem-situations where is implemented and the identification of its constituent elements, mainly disciplinary contents. Perrenoud (Perrenoud P., 1999) identifies ten new skills for teaching, including "managing the progression of learning" including "establishing links with the theories underlying the learning activities".

McTighe (McTighe J. et alii, 1996) considers the evaluation rubric as a general evaluation tool used to evaluate the quality of products and performance in a given area. A rubric includes a scale of predetermined scores and a list of criteria describing each score's characteristics on the scale. The rubrics are frequently accompanied by examples of products or services to illustrate each score. This is a brief "skill" description helpful in identifying and explaining the expectations bounded to a certain student or group of students. It analytically describes the expected performance at the end of the teaching project in terms of visual elements. It is a formative evaluation tool since it strategically orientates the teaching/learning path in terms of timing, choice of methodologies, tasks, evaluation by students of their work. As a result is the focus on competence, the rubric should be constructed by mediating between regulatory/disciplinary needs and constraints and contextual specificities.

Therefore, the teacher/educator should reflect on the following elements:

- what aspects need to be considered for evaluating a certain performance (e.g. if I want to evaluate the quality of a video clip produced by a group of students, I can identify the evaluation aspects regarding the editing);
- what are the criteria on which the dimensions are evaluated (e.g. the dimension of editing I define is that the video has to meet a concordance between sounds and images);
- what are the indicators to be used (e.g. the video always has a concordance between sounds and images: concerning the processing of visual information, the video shows the balance between the text and graphics);
- according to the identified indicator, what is a concrete example of performance;
- the achievement's standard can be expressed in levels;
- in my experience, which performances I recall as meaningful examples of development (or non-development) of the selected competence;
- what defines these performances as excellent, good, on average, poor about the identified competence.

Afterwards, teachers/educators define the dimensions of the competence and then describe each of them the performance's characteristics and the expected levels.

To check an evaluation rubric drafting, the following elements can be considered:

- the most relevant dimensions of competence have been explored (validity);
- the criteria and indicators develop important aspects of the dimensions (articulation);
- the levels of competence provided are adequate to the characteristics of the students (feasibility);
- the levels of competence proposed are clear and precise (clarity);
- the rubric provides reference points allowing homogeneous evaluations among teachers (reliability);
- the rubric provides useful reference points for evaluating students (utility);
- the levels of competence proposed to highlight the progress and points of advancement (promotion).

To use an evaluation rubric focalized on "competence", a situation-problem, in terms of contextual constraints and stimulus, should be determined.

For example, teachers bring students to the cinema to watch a movie. The day after, they are expected to evaluate it according to some criteria (e.g. direction, photography, screenplay, etc.). In this case, the class can agree on the list of "dimensions" (all the aspects to be assessed) and organize them into criteria and indicators by preparing an evaluation rubric.

After one week, the same class could watch another movie and then evaluate it with a better tool than the previous time.

The steps for constructing a rubric are as follows:

1. evaluation task-oriented, to set up the performance's quality and standard;
2. scoring criteria definition;
3. the practice of scoring;
4. review protocol;
5. scores recording;
6. the documentation for the assessment reliability.

While in teacher-centred learning, the rubric represents teachers a tool to use to combine the three variables, learning, teaching and assessment; in learner-centred learning, it is shared with students the evaluation criteria by favouring self-regulated learning.

The advantages of using the rubric are the following:

- allowing a coherent evaluation of performance and authentic tasks, supervision and monitoring of student progress (judgment consistency);
- ensuring validity without giving up the reliability, providing more accurate and fair assessments and the scores are more objective avoiding personal prejudice (performance evaluation validity);
- it is used as an assessment and teaching tool, supporting to explain learning goals and standards, improving performance to achieve the standards, helping students focus on their learning efforts, producing a better quality of tasks and grades (learning promotion);
- using criteria and standards provides students with informative feedback, saves time, and facilitates the feedback process (feedback promotion).

Therefore, the rubrics provide reliable information on what students know and can do and promote learning by offering clear performance targets according to established standards.

Some examples are taken from the scientific literature:

- students in a science class used the rubric in a self-assessment process; the group achieved higher levels of performance than the group who did not use it (Andrade H. G., 1999);
- the students interviewed stated that the use of a rubric or a checklist helps to clarify expectations and the self-assessment (Andrade H. et alii, 2005);
- the combination of a written assignment and a rubric affect positively critical thinking development by improving evaluation scores by approximately around 41% (Schamber J. F. et alii, 2006).

In summary, to construct an evaluation rubric, the task has to be defined, and its description should include both performance and expected behaviour in terms of paper, poster or performance.

Moskal (2002) identifies six guidelines:

1. the established criteria in a scoring column have to be in line with the task needs and the fixed objectives;
2. the scoring criteria have to be observable behaviour or defined characteristics of the product;
3. the score rubrics have to be clearly written and fully understandable by the students;
4. the number of points to be used in a scoring rubric has to be relevant;
5. the separation among the scoring levels has to be clear;
6. the criteria statements have to be fair and free from any prejudice.

There is no specific template for a rubric.

To develop it, students are expected to collaborate based on their knowledge of the subject.

However, it's important to use neutral words and not be limited to the numerical indication for each established level; use several scoring levels to avoid assigning an average level.

The following table shows an example of a video product evaluation rubric.

Table 25. Example of a video product evaluation rubric

Dimension performance level	Judgement / Rating			
	Excellent	**Good**	**Essential**	**Poor**
Required elements/items	The video shows all the required elements and additional information.	The video shows all the required elements.	The video does not show all the required elements.	Many required elements are left out.
Reliability of visual elements	All visual elements are related to the central topic and make it easier to understand. All borrowed graphs show a citation of the source.	All visual elements are related to the central topic and make it easier to understand. Some borrowed graphs show a citation of the source.	The visual elements are related to the central topic. One or two borrowed graphs show a citation of the source.	The visual elements are not related to the central topic. The graphic elements borrowed do not have a citation of the source.
Attractiveness	The video is exceptionally attractive in terms of structure, image quality and photography.	The video is attractive in terms of structure, image quality and photography.	The video is acceptably attractive, but it can be improved upon.	The video is not attractive in terms of structure, image quality and photography.
Film script	The text is clear, consistent with the purpose of the video. It shows consistency between the description of the scene and the dialogue. There are no grammatical errors	The text is clear, consistent with the purpose of the video. In many scenes, it shows the coherence between the description of the scene and the dialogues; it needs improvement in	The text must be improved in clarity and consistency with the purpose of the video. The text must be improved in the consistency between the description of the scene and the	The text is not clear and consistent with the purpose of the video. The text does not show the coherence between the description of the scene and the dialogues.

		others. There are some grammatical errors.	dialogues. There are grammatical errors.	It has many grammatical errors.

This other table shows an example of an evaluation rubric in an online search process:

Table 26. Example of an evaluation rubric of the online search process

Dimension performance level	Judgement / Rating			
	Excellent	**Good**	**Essential**	**Poor**
Research and organization of resources	The learner knows how to search for resources on the web independently. She/he knows how to organize information coherently. She/he knows how to cite the sources of the borrowed information.	The learner knows how to search for resources on the web independently. She/he knows how to organize information. Much borrowed information shows a citation of the source.	The learner knows how to research and organize some readily available resources. Only some borrowed information shows the source citation.	The learner knows how to explore the resources provided and organizes them only when guided. She/he cannot cite the sources of the borrowed information.
Use of technical devices	The learner knows how to use the technical devices proposed independently. It can identify alternative solutions.	The learner knows how to use the proposed technical devices independently.	The learner knows how to orient himself in using the proposed technical devices but has difficulties.	The learner has difficulty using the proposed technical devices and requires others' support (other students, teacher).
Management of interaction in the group-class	The learner actively participates, motivating the group, intervenes respectfully.	The learner actively participates, intervenes respectfully.	The learner respects the shifts to intervene but does not always participate.	The learner intervenes only if requested, does not respect the shifts to intervene.
Time management	The learner meets the deadline. She/he manages time in a way that is congruent with deliveries.	The learner meets the deadline. She/he is committed to managing working times.	The learner meets the deadline but struggles to manage the working time.	She/he does not meet the deadline and struggles to manage working times.
Ability to argue	The learner argues autonomously, clearly and exhaustively.	The learner argues clearly. If stimulated, she/he can expose the relationships between concepts.	The learner argues autonomously, but if stimulated, she/he finds it hard to problematize the relationships between concepts.	The learner struggles to argue clearly and comprehensively unless guided by the teacher.
Use of the lexicon	The learner knows how to express himself clearly and comprehensively. She/he can use synonyms, even those not used by the teacher.	The learner knows how to express himself clearly. She/he knows how to use appropriate terms.	The learner knows how to express himself using terminology in an imprecise way. If stimulated, She/he can correct her/himself.	The learner uses terms that are not always appropriate to the context. She/he must be led to understand the meaning.

3.4 The assessment and evaluation systems in distance learning

Technology-enabled tools also can support teacher evaluation and coaching. These tools capture video and other evidence of qualities of teaching, such as teamwork and collaboration. They provide new avenues for self-reflection, peer reflection and feedback, and supervisor evaluation[14].

The assessment allows both instructor and student to monitor progress towards achieving learning objectives and can be approached in various ways. There are two main types of assessment: summative assessment and formative assessment. These are sometimes referred to as assessment of learning and assessment for learning, respectively. The key to good assessment practice is to understand what each type contributes and build mechanisms and solutions to maximise each's effectiveness. Formative assessment can be tutor-led, peer or self-assessment. Formative assessments have low stakes and usually carry no grade, which may discourage the students from doing the task or fully engaging with it. The summative evaluation can significantly affect conjunction and alignment with formative assessment, and instructors can consider a variety of ways to combine these approaches.

Both forms of assessment can vary across several dimensions (Trumbull and Lash, 2013):

- informal / formal;
- immediate / delayed feedback;
- embedded in lesson plan / stand-alone;
- spontaneous / planned;
- individual/group;
- verbal/nonverbal;
- oral/written;
- graded / ungraded;
- open-ended response / closed/constrained response;
- teacher-initiated/controlled / student-initiated/controlled;
- teacher and student(s) / peers;
- process-oriented / product-oriented;
- brief / extended;
- scaffolded (teacher supported) / independently performed.

An over-reliance on summative assessment after an element of study gives students a grade but provides very little feedback to help them develop and improve before they reach the end of the module/programme. Formative assessments provide a highly effective and risk-free environment in which

[14] https://tech.ed.gov/netp/assessment/

students can learn and experiment. They also provide a useful lead-in to summative assessments, so long as the feedback is provided. Therefore achieving a balance between formative and summative assessments is important.

Digital technologies used in education include student e-portfolios, social media, digital textbooks, mobile learning, classroom polling, digital games and integrating formative and summative assessment. According to research focused on a review of the literature and publications on digital formative assessment, resulting from international research and policy studies (Looney J., 2019), digital learning and assessment have the potential to support more powerful student learning. Approaches to formative assessment reflect education cultures and thus vary across countries and research traditions. While digital formative assessment may significantly impact student motivation and learning, its effectiveness also depends on how it is used and how it is integrated with teaching and learning aims. Formative assessment is not one specific practice but rather an approach to teaching and learning. It may be best seen as a dynamic process, as teaching and learning are adapted according to conditions and needs identified in the assessment process (Clark I., 2010).

The OECD - *Organisation for Economic Co-operation and Development* (2005) synthesised different approaches to formative assessment based on international research and observations of classroom practices across several OECD countries and suggested a general framework encompassing:

- establishment of learning goals and tracking of individual student progress toward those goals;
- use of varied approaches to assessing student understanding;
- feedback on student performance and adaptation of instruction to meet identified needs;
- active involvement of students in the learning process;
- use of varied instruction methods to meet diverse student needs;
- establishment of a classroom culture that encourages interaction and the use of assessment tools.

More recently, Black and Wiliam (Black, P. et alii, 2018) have highlighted that any "*theory of formative assessment*" needs to *"…be embedded within a wider theoretical field, specifically, within a theory of pedagogy*". The authors propose a model for educational activities influenced by theories of pedagogy, instruction and learning, and subject disciplines (Figure 16).

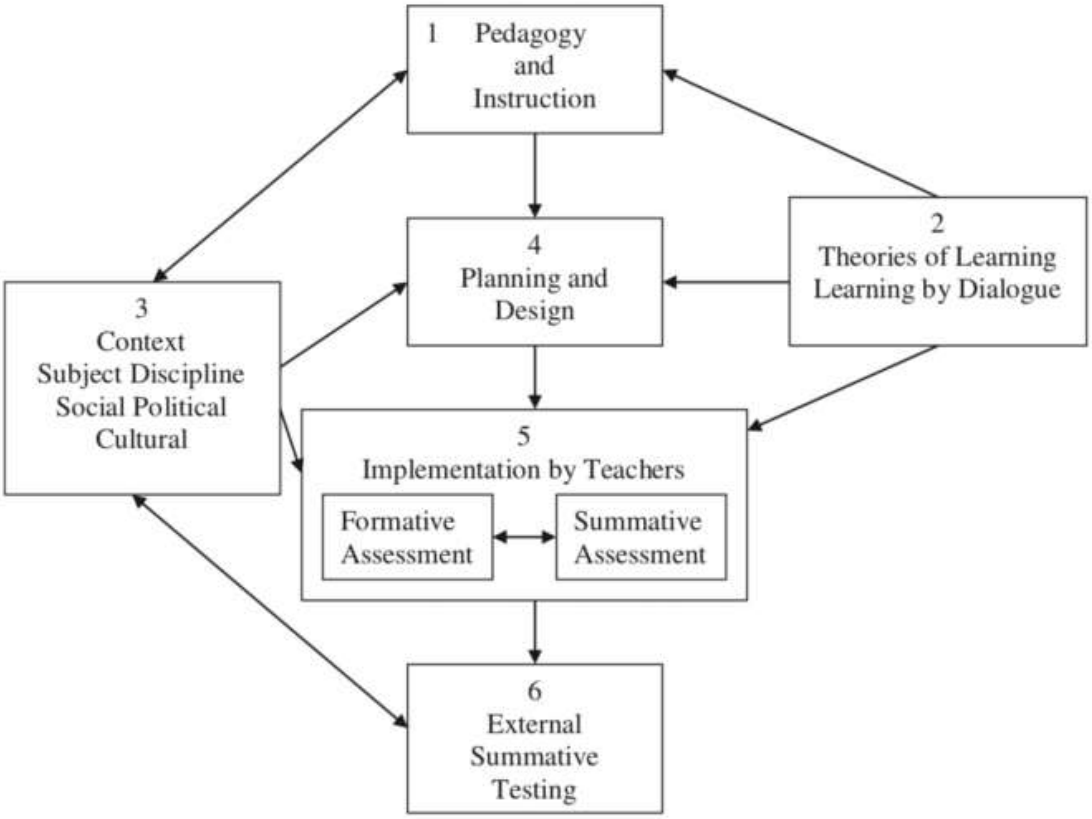


Figure 16. Model for an assessment concerning pedagogy

Source: Black and Wiliam, 2018, p. 551

The advantages of different digital learning environments could be summarized as follows:

- rapid (real-time) feedback and staging of next steps for learning at an appropriate level of difficulty;
- support for learners' choices (to personalise learning and support intrinsic motivation);
- immersive learning environments to support situated learning;
- mobile tools to support the assessment of "anytime-anywhere" learning;
- set up of complex problems that challenge learners and support collective engagement in problem-solving in small groups or massively multiplayer online platforms;
- opportunities for self-and peer-assessment;
- access to resources and online exemplars;
- collection ("mining") of educational data to better understand learning processes and contexts, and in turn, use these data to generate learning analytics to predict student progress and adapt learning;
- potential for more seamless integration of formative and summative assessments;
- opportunities for learners to design their own learning goals and strategies.

According to Black and Wiliam, the digital formative assessment includes all features of the digital learning environment that support the evaluation of student progress and provide information to be used as feedback to modify the teaching and learning activities in which students are engaged. Assessment becomes 'formative' when teachers and learners use evidence of learning to adapt to the learning process's next steps.

In her comprehensive study, Looney (2019) proposes a typology presented in the following table. A range of tools and platforms that support digital formative assessment are set out in the typology's vertical axis. In contrast, different modes for the formative evaluation are set out in its horizontal axis.

Table 27. Typology of digital formative assessment tools, platforms and modes (Source: Looney, 2019)

Typology	Digital learning environment	Student-centred learning and assessment	Student collaborative learning and assessment
Personalised learning platforms • **e-portfolios/digital diaries**	Students' learning environments, use of multi-modal materials/tools.	Student-directed, reflection, self-assessment.	Peer assessment, collaborative projects, etc.
• **Digital storytelling**	Students' learning environments, use of multi-modal materials/tools.	Student-directed, reflection, self-assessment.	Peer assessment, collaborative storytelling, etc.
• **Social media (blogs, wikis)**	Students/teachers identify areas for online discussion. Integrated with other tools (e-textbooks, mobile learning, etc.).	Peer feedback	Discussion boards, Facebook, blogs and wikis, text messages and other social media to support peer collaboration and assessment.
Online resources	Internet-based resources to support student research.	Teacher scaffolding to develop student research skills.	Peer assessment, collaborative research project.
E-textbooks	Multi-modal materials/tools to demonstrate and model content/interactivity.	Student self-pacing; Automatically differentiated (adaptive) or determined by the teacher (non-adaptive).	Discussion boards, Facebook, blogs and wikis, text messages and other social media to support peer collaboration and assessment.

A range of tools and platforms that support digital formative assessment are set out in the vertical axis of the typology. In contrast, different modes for formative assessment are set out in its horizontal axis. The categories for the horizontal axis, in particular, require further explanation:

- **digital learning environment** – This column draws Black, and Wiliam's (Black P. et alii, 2018) proposed a model for an assessment about pedagogy. The term 'learning environment' within the typology thus refers to the use of digital platforms and tools to structure learning and content aims, guide and sequence activities, and elicit evidence of understanding. It may involve a combination of technologies as well as face-to-face interactions. The specific approach will vary by subject area and

learning aims but needs to be grounded in theories of learning and to support learning through interaction (whether with fellow learners, the teacher or with learning objects in the digital environment);

- **student-centred learning and assessment** – This column emphasizes student agency's importance, including student-centred learning and assessment to identify and adapt learning. For example, a variety of Web 2.0 tools may embed assessment (e.g. through quizzes embedded in e-textbooks), or students may use platforms to design their multi-modal projects. Assessment may draw on non-digital tools such as rubrics that set out standards and criteria by which to measure the quality of their work. E-coaches and other digital monitoring tools may help students to track their progress toward learning goals, provide automated feedback and/or scaffold activities for learning based on prior responses;
- **student collaborative learning and assessment** - This column emphasizes the importance of student collaboration and collective engagement in learning and assessment. For example, students may benefit from online peer feedback (e.g. through online discussion platforms). Multiplayer online games designed for educational purposes provide opportunities for students to address complex, ill-defined problems. In these environments, assessment is grounded in the problem-solving activity itself. While games may scaffold levels of challenge, learners participating in the process may also play an active role in assessing the effectiveness of different problem-solving approaches and may contribute new ways to refine and improve them.

Therefore, **the first column** highlights teacher decisions on how to use different digital tools and platforms to support student learning, track student progress, identify learning needs, provide varied instruction methods, and encourage student interaction and assessment tools in digital environments.

The second column highlights the use of digital tools and platforms to support each student's active involvement in his/her learning, learning scaffolding to meet specific learning needs, student choice and ability to focus on most motivating areas, and the use of assessment tools to track progress and adjust learning strategies.

The third column highlights the importance of classroom climate by encouraging interaction and the use of assessment tools. Students interact with each other, provide peer assessment and feedback, and interact with specific problems or learning challenges.

In the following paragraphs, the survey results show the primary assessment and evaluation systems in distance learning used in the classes in adult education in the partner countries.

3.4.1 Italy

The Italian analysis registered the following difficulties in managing adult learners in the virtual room:

- ICT basic skills;
- language;
- lack of digital devices, low network;
- low participation;
- no international exchange;
- discontinuous participation;
- keep the attention;
- no practical activities;
- moderate interventions.

As regards the monitoring tools for the learning level achieved, the Italian analysis registered the following options:

- exercises, interviews and simulations;
- written and oral examination, participation in various activities;
- formative and summative assessment;
- assessment grids of skills developed;
- tests;
- rubrics;
- multiple-choice;
- discussions/dialogue;
- realia tasks and Lab activities;
- ECDL examination.

Among the criteria used to assess student performance are the following:

- understanding, listening and elaboration;
- students' engagement and improvement achieved;
- participation and skills development;
- know-how;
- level of the achieved competence, problem-solving capability and self-evaluation;
- knowledge and abilities reached;
- autonomy level reached during the simulations;
- theoretical knowledge and its application;

- progresses in respect of the initial learning situation.

For online evaluation, most respondents declared to prefer closed-ended and open-ended questionnaires. The least popular option is the interview. When it comes to online assessment administration and revision management, electronic register and the Google classroom tools are the most popular options. Besides, the function is also transferred to such instruments as Whatsapp, WeSchool, Questbase.

Below the main difficulties in the online learning evaluation system are listed:

- evaluate self-activity;
- difficulty to understand if the tasks were carried out at 100% by the student;
- objective evaluations;
- lack of devices or a good network from the students;
- cheating;
- reliability of responses;
- not everyone delivers assigned tasks;
- the use of different tools on different platforms;
- different monitoring of the results achieved by individual students;
- lack of constant feedback.

3.4.2 Bulgaria

Among the difficulties in managing adult learners in the virtual room, the following ones were registered:

- handling equipment, the level of their digital literacy
- dealing with digital technologies;
- uncertainty about one's skills;
- technical and software security;
- the activity of each learner;
- lack of social and educational contact;
- full range and control;
- lack of observation, which is a basic pedagogical tool;
- it is difficult to work with electronic platforms;
- insufficient skills to work in a virtual classroom.

As regards the monitoring tools for the learning level achieved, the Bulgarian analysis registered the following options:

- summary evaluation, ongoing evaluation;
- tests;
- project;
- practical tasks;
- individual tasks;
- exercises/laboratory and practical/interviews and simulations;
- written and oral exam, participation in various activities;
- formative and summary assessment;
- development of skills assessment networks;
- discussions/dialogue.

Among the criteria used to assess student performance, there are the following:

- the volume of acquired new knowledge;
- the volume of old knowledge to come into use;
- understanding the new material.;
- active participation;
- ability to analyse and make decisions;
- point system for doing tests;
- writing skills/correct text composition/level of correct handling of foreign language vocabulary;
- attitude to the task;

- diligence in the learning process, individual progress;
- achieved level of understanding of the problem;
- proper execution of the set tasks;
- accuracy and precision in performing operations;
- attitude to the subject and personal motivation;
- to what extent have the set goals been achieved?;
- progress;
- acquiring knowledge, work with tools and creativity;
- assessment of the psychological state of the student during the assessment;
- accuracy of execution; quality of execution / for practical tasks;
- teamwork.

For online evaluation, most respondents declared to prefer closed-ended and open-ended questionnaires. Indeed, these results are closely related to the problems obstacles previously revealed.

When it comes to online assessment administration and revision management, electronic register and the Google classroom tools are the most popular options.

Below the main difficulties in the online learning evaluation system are listed:

- technical;
- identification of the level of independence;
- online learning is ineffective for teaching practice. It is a temporary measure, but for the educational process and assessment to be effective, the training must be in a real environment, in a school;
- lack of motivation for active participation;
- possibility to copy and use additional materials that would not be allowed in a real environment - there is no monitoring;
- insufficient opportunity to monitor the psychological state of the learner;
- online tests are suitable for general education disciplines, but in technical they have a lot of limitations;
- unrealistic assessment of knowledge;
- lack of control;
- lack of direct contact with trainees.

3.4.3 Romania

The Romanian analysis registered the following difficulties in managing adult learners in the virtual room:

- lack of digital devices;
- low network;
- discontinuous or low participation;
- a large number of students in classrooms (class size);
- lack of ICT basic skills;
- inefficient/ Ineffective communication;
- student demotivation;
- absence of feedback;
- technical difficulties;
- impossibility to solve practical tasks.

As regards the monitoring tools for the learning level achieved, the Romanian analysis registered the following options:

- tests;
- questionnaires;
- written and oral examination;
- multiple choice;
- projects;
- portfolios;
- practical activities;
- formative and summative assessment;
- summary evaluation, ongoing evaluation.

Among the criteria used to assess student performance, there are the following:

- consistent learning;
- acquiring new understanding, knowledge, behaviours, skills and values;
- active participation and constant involvement;
- increasing motivation;
- relevant content;
- needs assessment;
- fluency in foreign languages;
- proper execution of the set tasks;

- accuracy in performing operations;
- know-how;
- level of the achieved competence;
- problem-solving capability;
- theoretical knowledge and its application.

The individual work for students is practised by the majority of respondents (69,23%).

If the self-study activities are not practised, the basic motivations proposed are the heterogeneity of the class composition in terms of development levels, the lack of devices and ICT basic skills, and the difficulty in connecting students to the Internet.

For online evaluation, most respondents declared to prefer closed-ended and open-ended questionnaires. The least popular option is the interview. These results are closely related to the problems as being more demanding in terms of connection quality and the students' skills.

When it comes to online assessment administration and revision management, Google classroom tools are the most popular options (81%).

Below the main difficulties in the online learning evaluation system are listed:

- technical difficulties;
- demotivated students;
- difficulty to understand if the student carried out the tasks;
- monitoring efficiency;
- lack of devices or deficient network;
- impossibility of carrying out practical tasks;
- not everyone delivers assigned tasks;
- lack of constant feedback.

3.4.4 Spain

The Spanish analysis registered that the online assessment tools are considered similar to those carried out in a face-to-face modality: oral and written exams (as far as possible), essays, interviews, etc. Regarding the management and revision of online assessment, email and social networks have been the basic communication channels between students and teachers; likewise, two management and revision platforms of the learning process have been introduced and developed: the Virtual Classroom offered by the EducaMadrid digital platform, belonging to the Ministry of Education of the Region of Madrid, and the platform provided by the Google company: Google Classroom. Programs, such as Zoom or Jitsi, have also been used for video call making.

Concerning the difficulties found while carrying out the evaluation process, the lack of immediate feedback between students and teachers and the lack of training when using different procedures and tools to evaluate both content and skills can be mentioned. Furthermore, despite the means described in the previous paragraph, there are serious shortcomings while considering a digital environment since it has traditionally been carried out face-to-face.

Using digital technology to grade and provide feedback on assignments electronically delivered would also be very helpful, as the concept of self-assessment is considered relevant today.

As regards the monitoring tools for the learning level achieved, the Spanish analysis has been registered the following needs:

- design of individualized tests adapted to the students' needs;
- design of highly varied and inclusive evaluation tests;
- possibility of managing evaluation through different channels and at different times, thus facilitating the autonomy of the students to take the test;
- applications that allow students immediate self-evaluation.

Among the criteria used to assess student performance, one of the most used criteria states that the student "must know, explain and apply the curriculum contents." Thus, most of us turn this idea into different "measurable" tools (learning standards) such as, for example, objective tests, both written (tests, assignments, exams, practices, workbook) and oral tests (presentations, spontaneous questions in class, interviews).

Another meaningful criterion applied in our CEPA is the assessment of "interest in the subject and personal effort". This concretion is observed in the production and resolution of daily tasks, their appropriate presentation, expression, calligraphy and spelling, in addition to active participation in classes and the representation of the necessary material for it.

Among the evaluation tests that are carried out using ICT, the following can be underlined:

- tests that include different types of questions, such as those mentioned by Cabero and Gisbert (2002): multiple-choice questions, short-answer questions, crossword-type questions, matching questions, complementation questions, true-false questions, questions for image and sentence sequencing, ordering questions, etc.;
- conceptual maps allow to identify the relationship that is established between the different concepts of a topic;
- word and template processors to formulate activities or problems to apply what they have learned in possible or real cases, guiding the student in their realization;
- self-evaluation exercises through templates. These offer students the possibility to reflect and participate in their learning process.

For online evaluation, most respondents declared to prefer closed-ended and open-ended questionnaires. Therefore, the electronic portfolio supports the evaluation of the teaching-learning process. As an evaluation tool, a rubric system is proposed to check the degree of completion of the students' tasks.

It considers convenient to present the evaluation model that we have carried out for years in our FPB. It has designed an open and dynamic assessment, integrated into the daily work carried out in class. The student takes responsibility for it (no scares or “last-minute miracles”). Based on PBL and evaluation integrated into the learning process, on positive reinforcement, on immediate results, make the students responsible for their evaluation evidence, which forces them to be aware. For each module, students have a stamp sheet where we reflect the daily work they do, assessing not only the content but (and especially given the profile of our students) also the skills. In this way, when the student performs the task well.

3.5 Recommendations and Considerations for Online Assessments

3.5.1 Summative assessments

Since summative assessments are usually higher-stakes than formative assessments, it is essential to ensure that the assessment aligns with the instruction's goals and expected outcomes. In this regard, the following main issues have to be considered:

- using a **Rubric or Table of Specifications** to layout desired performance criteria for a range of grades. Rubrics will describe what an ideal assignment looks like and "summarize" expected performance at the beginning of the term, providing students with a trajectory and sense of completion;
- **designing clear and effective questions** that meet criteria by allowing students the freedom to express their knowledge creatively and in those ways how they constructed or mastered meaning;
- **assessing comprehensiveness** - effective summative assessments provide students with an opportunity to consider the totality of a course's content, making broad connections, demonstrating synthesized skills, and exploring deeper concepts that drive or establish the course's ideas and content;
- **making parameters clear** - when approaching a final assessment, instructors can ensure that parameters are well defined (length of assessment, depth of response, time and date, grading standards); knowledge assessed relates clearly to the content covered in a course, and students with disabilities are provided required space and support;
- **considering blind grading** - teachers/educators may wish to know whose work they grade to give feedback on a student's term-long path. If teachers/educators wish to provide truly unbiased summative assessment, they can also consider various blind grading techniques.

3.5.2 Formative assessments

Ideally, formative assessment strategies improve teaching and learning simultaneously. Teachers/educators can help students grow as learners by encouraging them to self-assess their skills and knowledge retention and give clear instructions and feedback. Seven principles (adapted from Nicol D., 2007 with additions) can guide Teachers/educators strategies:

- **clear criteria for what defines good performance should be specified** - teachers/educators can explain criteria and encourage student discussion and reflection about these criteria;
- **students' self-reflection encouragement** - the students could be asked to utilize course criteria to evaluate their own (or a peer's) work and to share what kinds of feedback they find most valuable;

- **provide detailed and actionable feedback to students** - teachers/educators can consistently provide specific feedback tied to predefined criteria, with opportunities to revise or apply feedback before final submission. Feedback may be corrective and forward-looking, rather than just evaluative. Examples include comments on multiple paper drafts, criterion discussions during 1-on-1 conferences, and regular online quizzes;
- **teacher and peer dialogue around learning encouragement** - teachers/educators can discuss the formative learning process with the students on the course, and teachers/educators respond to student concerns. During the feedback sessions, the students can also identify examples of feedback comments they found useful and explain how they helped;
- **promoting positive motivational beliefs and self-esteem** - students will be more motivated and engaged when they are assured that teachers/educators care for their development. Teachers/educators can allow for rewrites/resubmissions to signal that an assignment is designed to promote learning development. These rewrites might utilize low-stakes assessments or even automated online testing that is anonymous and (if appropriate) allows for unlimited resubmissions;
- **provision of opportunities to close the gap between current and desired performance** - teachers/educators can improve student motivation and engagement by making visible any opportunities to close gaps between current and desired performance such as opportunities for resubmission, specific points for task-based assignments, etc.;
- **collect information that can be used to help shape the teaching** - teachers-educators can feel free to collect useful information from students to provide targeted feedback and instruction. Students can identify where they are having difficulties, either on an assignment or test or in written submissions. This approach also promotes metacognition, as students are asked to think about their learning. A classroom observation or conduct a small group feedback session can also be performed to provide teachers-educators with potential student struggles.

3.5.3 Assessment solutions based on DIGCOMP

As in other implementation steps, using the DIGCOMP framework involves selecting the relevant competencies to be assessed, based on the target users and goals of the initiative. Assessment solutions can also be based on adapted DIGCOMP frameworks. Then, DIGCOMP components (competence descriptors, learning outcomes at different proficiency levels, examples of skills, knowledge and attitudes) can be used:

- to prepare self-assessment questions directly or with some variations;

- as a reference to prepare more detailed and contextualised questions (referring to specific tools, application domains etc.), both in self-assessment or knowledge-based perspectives (most experiences);
- to inspire the preparation/description of authentic tasks and challenges for evaluation, both in knowledge-based and performance-based perspectives.

Concerning assessment methodology, different approaches with different pros and cons can be adopted, depending on one's goals and target users (e.g. population at large, specific worker categories etc.), circumstances and resources:

- **self-assessment questions,** where individuals are asked to evaluate how well they perform ICT related tasks and what they know about related issues or agree/disagree through a declarative questionnaire with statements about one's behaviour in different digital situations. This approach is useful to raise awareness about digital competence and make users reflect on their perceived strengths and weaknesses;
- **knowledge-based tests**, where individuals are presented with real problems in various real-life situations and have to indicate what they would do in a given situation, what would happen in reality, etc. This approach measures factual knowledge (knowing that…) and procedural knowledge (knowing how to perform digital tasks) or both. It can thus produce a more accurate picture of a user's digital competence;
- **performance-based evaluation**, where users are requested to solve digital challenges, reflecting real situations that they may face and entailing using tools such as browsers, word processors, spreadsheets etc. This approach generates the most accurate picture of one's competence seen as 'knowledge in action. But it can be very demanding (also in terms of technical complexity and costs) for test providers and challenging for users. So it is usually adopted given issuing a certification;
- **a mix of the above methods**. To offer a complete assessment and resulting profile, a test can integrate other elements beyond competences.

3.5.4 Online Assessments

In light of the online learning context and to best support academic integrity, it is important to consider the format of the assessments (e.g., multiple-choice, short answer, project-based), the level of thinking the assessments require as well as the established grading structure of the instructional flow. Specifically, the following considerations should be discussed:

- **selection of assessment formats that ask students to explain their thinking** - academic integrity can be increased by asking students to explain their approach, logic, or thinking. This can involve

short-answer items, written work, annotated portfolios or recorded/annotated presentations. Multiple-choice exams can also be adapted to ask students to explain how they came to an answer. These explanations are harder to replicate than selecting the correct answer. This approach has the added benefit of improving students' reflection on course content, which supports deeper learning;

- **selection of assessments that require deeper processing levels** - deepening the level of engagement required to answer items correctly can reduce the likelihood of an answer is easily found online or in textbooks. For example, multiple-choice items that ask students to compare among options or apply a specific concept instead of asking for definitions reduce opportunities for cheating. These higher-level items require a working knowledge of a concept, demonstrating a desired level of competence;
- **usage of a grading structure that supports the building of knowledge over time -** altering the grading system to provide credit for students' learning as they go through the course (i.e., formative assessment) as opposed to high stakes assessments at the middle and end of courses (i.e., summative assessment) can be especially beneficial. Smaller assignments or quizzes allow students to study less material more deeply, provides feedback on their learning with enough time for them to adjust their studying, and can reduce student anxiety compared to having a low number of high stakes exams;
- **increasing academic integrity in multiple-choice and short-answer exams** - utilizing the options of the quiz development apps for randomization of quiz questions' order and the order of the responses within questions. Considering small edits to a question that change the correct answer between students while testing the same concepts. In this approach, the basic concepts are retained across questions but with subtle factors that change the outcome;
- **considering options and implications for when to take the test** available to students and how long to give students complete it, particularly if students vary across time zones. For example, some teachers/educators prefer to leave the exam open for 12-48 hours to allow for time zone and technical challenges. Another option - to "chunk" exams into smaller sections spread out over time, allowing students to focus on particular content while decreasing the stress on any single section of the exam;
- **practising the process** - giving students a chance to try out the selected assessment approach using a low-stakes exam or assignment can help teachers/educators and students work out any technical challenges (e.g., uploading files, accessing links) that may arise during a higher-stakes exam. This will also allow students to experience what an online examination may be like, which can help alleviate student anxiety;

- **provision of possibility for students to be able to upload their work**. Creating questions that ask students to demonstrate their knowledge through models or figures can help students practice their learning. This approach also allows for the consideration of partial credit options.

These approaches, mainly when combined, essentially give each student a distinct test form. This can decrease the likelihood of dishonesty by increasing the effort associated with sharing or searching for answers. By taking these measures, students and instructors can focus on the course content rather than spending energy concerning academic integrity. Moreover, the selected assessment approaches have to ensure equity and fairness in grading and the process's complete transparency.

4. ANALYZING OF THE CURRENT TRENDS IN THE USE OF TECHNOLOGY INTO THE CLASSES FOR ADULT EDUCATION

The DIGCOMP framework is being constantly updated. It shows the dynamic nature: since ITCs are continuously changing, what must be learned about the digital landscape is continually transforming. Therefore, being a digitally competent individual is a moving target for citizens requiring cognitive flexibility and openness towards change. A key message from this for adults' trainers in the field is that, rather than focussing on merely technical knowledge or specific IT tools, which risk becoming rapidly obsolete, trainers should encourage learners to approach "the machine" by trial and error stimulating exploratory attitudes, abductive abilities and problem-solving skills.

As for the exploratory attitudes, the trainers should encourage the trainees to approach the new software and/or digital interfaces with curiosity, looking around the screen, trying and testing, formulating hypotheses on the functions associated with the icons. Therefore, rather than stressing the need for memorising technical procedures – which is also challenging, especially for older people, trainers should encourage trial-and-error learning processes, where making mistakes is not a shame but a productive way to reflect on the causes of the error while being successful may generate new good practices.

Trainers should also promote abductive processes of making inferences related to the elaboration of information found on the web. While browsing the web is not a linear process, serendipity is the main feature of how people access online resources. This involves a positive attitude towards the unknown or also a pleasure for random discoveries. But to make sense of random discoveries, the ability to carry on abductive inferences becomes crucial. Thinking of the web, the navigation experience from one Internet source to another requires users to develop the ability to generate new meanings in the broad landscape of the networked digital complexity.

4.1 The current European experiences on how to introduce the technology into the classes

Among the recent experiences on introducing the technology into the classes in adult education, some relevant projects have been identified at the European level.

IDEAL - Integrating Digital Education in Adult Literacy

IDEAL (https://www.erasmusideal.com/) was an Erasmus+ project - Cooperation for innovation and the exchange of good practices - Strategic Partnerships for adult education co-funded by European Commission and coordinated by Luksia, Municipal Education and Training Consortium in Western Uusimaa. The aim was to provide guidance and training for adult educators across Europe to use ICT tools and digital methods to deliver basic skills education better. This was done through an integrative approach in collecting, sharing

and disseminating innovative and inclusive teaching and learning practices using ICT tools and digital methods. The project included the following main activities: developing guidance and training for adult educators and share the existing pedagogical know-how of partner organizations; organisation of two 5-day learning workshops in Finland and Italy.

The outputs developed included an Online Toolkit with Context and Need analysis, Good Practice Guidelines and Video Tutorials for teachers, trainers and other practitioners on integrating digital education in adult basic skill teaching.

In particular, the first guideline referred to the use of "gaming" to playing electronic games via consoles, computers or mobile phones, and social tools to enable people to meet, connect, or collaborate through computer-mediated communication and form online communities.

The second one was related to the accessible virtual learning environment (VLE) by organising and adapting the VLE so that all students can cope better with the lessons, learning content, materials and assignments by using the principles of UDL (Universal Design for Learning) for designing and organising an accessible VLE.

Finally, the third regarded the interactive whiteboard (IWB), aboard the size of a traditional whiteboard that connects to a computer; a projector projects the computer's desktop onto the board's surface; users control the computer from the board using a pen, finger, stylus, or another device.

SEE, TELL AND LISTEN: Improving Refugees' Digital Literacy through Photovoice and Storytelling

See, Tell and Listen project (https://www.seetell-listen.com/) was co-founded by European Commission in the framework of Erasmus+ - Cooperation for innovation and the exchange of good practices - Strategic Partnerships for adult education and coordinated by Onselho Portugues para os refugiados CPR. The aim was to enhance refugees' capabilities in the field of digital literacy and storytelling technique to give voice to people who have experienced a severe loss of control in their lives through the acquisition and/or the use of new tools and abilities.

The project was structured towards social inclusion along two axes:

1. Acquisition of tools and skills which are key to self-sufficiency in the current knowledge economy, particularly digital literacy, and the ability to create and shape narratives on forced displacement, which are key to enable refugees' sense of mastery over their life courses;
2. Development of innovative practice in education, specifically adult education, in an increasingly digital economy and information-centred society. Experience shows that traditional learning and teaching are not always adequate to refugees' needs, particularly upon arrival. Innovation is thus, the first-order need when training curricula are designed.

FLIP THE CLASSROOM!

"Flip The Classroom!" project (https://flippedclass.weebly.com/) was co-founded by European Commission in the framework of Erasmus+ Cooperation for innovation and the exchange of good practices - Strategic Partnerships for adult education and coordinated by Midstod Simenntunar a Sudurnesjum (Iceland). It aimed to introduce adult's literacy teachers with innovative methods of learning immigrants foreign languages. It concentrates mainly on the concept of the Flipped Classroom to replicate into their classes. The teachers involved participated in lectures, practical exercises, activities based on role-plays. During the project, discussions took place to compare participants' views, knowledge and experiences associated with teaching adults.

In detail, the project intended to provide adult literacy teachers with the knowledge on how to enrich the process of teaching adults foreign languages with special attention will be given to the technique known as "Flipped Classroom".

AHEAD - Web-based PBL training to improve headmasters skills and promote an 'innovative school.'

The AHEAD was a Comenius project aiming to provide principals with the need skills (leadership and management) to cope with the European project's management and build a team in charge of the EU projects. The AHEAD didactic model combines a web-based PBL (Problem-Based-Learning) approach with a peer training method to promote the ongoing updating of headmasters' practical skills.

The main project results and products are the following:

- AHEAD DIDACTIC MODEL for the improvement of headmasters' practical skills to build a team within the school able to carry out innovative/research activities;
- E-LEARNING PLATFORM AND PBL REPOSITORY as web learning/collaborative setting for principals. It includes an e-learning platform and a PBL repository (a sort of "virtual training library") that will host the headmasters' cases/scenarios based on their real experiences;
- SELF-LEARNING TOOLKIT to promote the regular updating of headmasters skills and exploits the AHEAD didactic model among EU schools thanks to a peer-training approach. It includes a set of tools and guidelines for principals to develop case/scenarios according to the AHEAD didactic model, during and after the project end, and allow the exchange of good practices among the EU schools and promote the ongoing updating of their skills.

4.2 The good practices selected in the partner countries on how to use the technology with adult learners

Among the recent experiences on introducing the technology into the classes in adult education, some relevant initiatives and good practices have been identified in the partner countries: Italy, Bulgaria, Romania and Spain.

4.2.1 Italy

Name and description of the selected initiative/good practice	**Erasmus+ project "You Dig-IT"** **https://www.associazioneaim.it/youdigit**

The project aimed to raise teachers, educators, facilitators, and adult students towards using the latest generation digital tools for educational purposes, mainly if their use is guided and organized by competent staff and learning tutors. Teachers and students learned how to use digital apps and platforms for learning in various subjects, including Duolingo, Prezi, Memrize, Facebook, Trello, etc.

The target groups of adults were: foreigners, young immigrants, students who live in particular conditions of hardship and fall into the category of young adults (aged 16 and over), but also older adults or perfectly literate people who, however, are entirely lacking - or almost - digital skills.

To develop the competences, the areas involved were:

- the cognitive area as sustained attention, response inhibition, speed of information processing, pattern recognition;
- the affective – expressive area as personal interactive skills, organization, critical incidents;
- the social area as sharing, cooperating, listening, following directions.

The activities were designed to be used in the classroom with students, by smartphone, or in computer labs about the online environment. The lesson implemented was frontal, interactive based on synchronous activities with learning by doing.

The project involved evaluating the apps and platforms used for their impact on learning. The tools used were individual assessment, questionnaires submissions. It was found increased motivation for using apps that use a playful approach (such as Duolingo). In general, students showed interest in digital media even if, in the case of digital illiteracy, there was also a particular fear that can generate a general sense of frustration.

Name and description of the selected initiative/good practice	Erasmus+ Project “Eda’n’Eda”

The project aimed to improve the digital skills of those involved in adult training, including innovative digital practices in teaching, learning, and assessing the skills. It aimed to promote the comparison and exchange of good methods in digital education for adults between organizations to differentiate the educational offer in the digital field in the contexts of formal adult education, improving the ability of the organizations involved to reach a more significant number of learners and integrate non-formal training opportunities aimed at optimizing transmission of advanced digital knowledge and skills.

The target group was teachers who deal with adult education to improve the digital skills for teaching.

To develop the competences, the areas involved were:

- the cognitive area as cognitive flexibility and control, multiple simultaneous attention, category formation, speed of information processing, pattern recognition;
- the affective – expressive area as personal interactive skills, organization, professional demeanour, professional responsibility, critical incidents;
- the social area as sharing, cooperating.

Each participant has been outlined a personal transnational training plan which included detailed information on preparation for the course or job shadowing abroad, logistic organization of the trip, activities internal and external follow-up.

About the online environment, the teachers used both the Basecamp platform for communications, the publication of materials and Zoom for video conferencing and online training activities. The lesson implemented was frontal, interactive based on synchronous and asynchronous activities.

To evaluate the target group's learning outcomes, the project used as tools questionnaires submissions and interviews.

4.2.2 Bulgaria

Name and description of the selected initiative/good practice	Simulation software products - the transition from theory to practice in training in digital circuitry

The project aimed to construct and test a model for improving the quality of knowledge in theory and skills in practice. Application software products are used to draw the schemes, connect measuring instruments to them, measure their parameters, and fill in protocols with the reported results.

The target groups were: 11th and 12th-grade students, independent form of education, qualification courses.

To develop the competences, the areas involved were:

- the cognitive area as focusing on creative and exploratory experiences; reinforcing the relationship between doing and thinking;
- the affective – expressive area as reinforcing emotive experiences; promoting the self-expression; supporting the expression of feelings, emotions and sensations;
- the social area as encouraging socialization and social relationships; focusing on relational and interactive "experiences"; encouraging interpersonal communication, discussion, collaboration, participation and team working;
- the psychomotor area as satisfying the movement needs through simulation activities.

The project was based on the simulation training method because the following advantages characterize it:

- a scheme is realized and studied by simulation within one to two school hours; it is more efficient;
- through simulation, the practical acquisition of skills increases up to 50% of the theoretical knowledge;
- students learn to use software products that have an actual application in business.
- Students' interest in technology increases, they acquire complex knowledge and skills in the form of games, compete with each other, "leaders of knowledge" appear.

Working with applied software products is extremely interesting and different from the standard form of training. Here, teachers come closest to the needs and interests of modern young people.

About the online environment, it was used “Proteus 8.3”. The schemes are illustrated on a screen shared by the teacher. When it comes to writing on a board, two options are used:

- the whiteboard in the platform we work with - MS Teams;
- the Paint 3D application in Windows 10, which gives much more excellent opportunities for this purpose.

With the teacher's help, students install the application software “Proteus 8.3” on their home computers. The lesson implemented was based on individual study, synchronous activity, pre-prepared teaching resources by teachers.

The students' learning outcomes were evaluated on individual assessment, presentation of simulation, questionnaires submissions, demonstration.

Name and description of the selected initiative/good practice	**Basics of Operational amplifiers**

The project aimed to achieve educational goals to adopt new practical and theoretical skills about operational amplifiers, learn how to use them in actual circuits, and measure both current and voltage using a multimeter. The project aimed to develop a logical way of thinking and the ability to conclude, form the ability to pay attention and self assess, learn how to work in a team, obey the safety rules, and have discipline.

The target groups were: 11th and 12th-grade students, independent form of education, qualification courses.

To develop the competences, the areas involved were:

- the cognitive area as increasing curiosity; focusing on creative and exploratory experiences; reinforcing the relationship between doing and thinking;
- the affective – expressive area as reinforcing emotive experiences; promoting the self-expression; supporting the expression of feelings, emotions and sensations;
- the social area as encouraging socialization and social relationships; focusing on relational and interactive "experiences"; encouraging interpersonal communication, discussion, collaboration, participation and team working;
- the psychomotor area as simulation activities.

About the online environment, the principle of operation of the operational amplifier can be explained with the help of theoretical materials on the Internet, for example:

https://www.electronics-tutorials.ws/opamp/opamp_1.html

Free Lightshot software is used to illustrate the explanations better. It allows part of the screen to be highlighted, thus directing students' attention to the desired location.

The lesson implemented was based on working in a group, synchronous activity, asynchronous activity, pre-prepared teaching resources.

The learning outcomes of the students were evaluated on class assessment, presenting learning scenarios/simulations.

4.2.3 Romania

Name and description of the selected initiative/good practice	International Standards training in VET for promotion of market-relevant education istraproject.eu

The ISTRA project's main objective is the development and piloting of two sets of innovative training approaches and contents for VET and C-VET training on two widely applicable series of standards (ISO/IEC 27000 and ISO 31000). The e-courses develop an innovative approach towards delivering theoretical knowledge and practical skills in applying standards in various spheres.

The project target groups are secondary VET school students, professionals needing C-VET and trainers in topics related to standards and standardization. The target groups gain innovative competences to respond to the modern requirements, better knowledge of the management systems and two of the most popular standards for management systems, adaptability in an online training environment, and better quality of the training.

Teachers and students learn how to use digital apps and platforms, including Moodle and ISTRA Virtual Learning Environment – a modern educational environment for learning about standards and standardization.

To develop the competences, the areas involved were:

- the cognitive area as focusing on creative and exploratory experiences, reinforcing the relationship between doing and thinking;
- the affective – expressive area as personal interactive skills, supporting the expression of feelings, emotions and sensations, strengthening emotive experiences;
- the social area as encouraging interpersonal communication, collaboration, participation and teamwork, following directions;
- the psychomotor area as satisfying the movement needs through simulation activities.

About the online environment, the project involves the use of apps and platforms for various subjects, smartphones and computers. The lesson implemented was frontal, interactive lesson, synchronous activity, learning by doing.

Although some of the teachers initially were reluctant to teach-learn-evaluate a module using online platforms, they improved their skills in using platforms to develop the training program in cooperation with other institutions. The tools used were individual assessment, questionnaires submissions.

Name and description of the selected initiative/good	eSKILLS4ALL

practice	

Many companies are creating badge issuing platforms compliant with Open Badges. They provide a wide range of services, which allow non-technical users to issue Open Badges credentials. Platforms each offer a mix of custom services, including online badge designers, badge discovery, issuing, assessment workflow, display, user profiles, social sharing, and tools to integrate with existing learning systems. All Open Badges issuing platforms should allow recipients to export their badges to a Backpack of choice. This enables users to stack and share their badges earned on different platforms and choose their own spaces to establish their identity on the web.

The project initiates a holistic approach to promote digital literacy, provides open and innovative training, learning, mobility and employment support. The project's aim is achieved through an electronic tool, based on an interactive and dynamic platform, necessary for the efficient acquisition of digital skills.

It has developed an online, interactive training delivery environment facilitated by social learning and an innovative online and in-house service, "e-SKILLS4ALL-SUPPORT-HUBS", to support the target group their search for a job. It creates badges for five different digital competencies: problem-solving, digital content creation, communication and collaboration, safety, information and data literacy. Open Badges provide portable and verifiable information about digital skills and achievements. The TOOL KIT includes all necessary material to be offered on-line and as hard copies: induction seminar, on-line learning modules, ICT Guides and a strategy for exploitation at the national level.

The project target groups are low-skilled adults, various forms of education or qualification.

To develop the competences, the areas involved were:

- the cognitive area as category formation, focusing on creative and exploratory experiences, reinforcing the relationship between doing and thinking;
- the affective – expressive area as professional responsibility, personal interactive skills, promoting the self-expression;
- the social area as socialization, collaboration, team Working, encouraging self-expression;
- the psychomotor area as simulation activities.

The online environment is represented by an interactive e-platform which also provides a forum for communication, a support hub and an e-employment data bank: https://academy.eskills4all.eu/

The lesson implemented was frontal, interactive lesson, and synchronous activity.

The tools used were individual assessment, questionnaires submissions, and simulations.

4.2.3 Spain

Name and description of the selected initiative/good practice	Technological first aid for lockdowns and pandemics

The project aimed to keep learning with mobile phones and laptop to consolidate the use of the Cloud, download images and documents from the internet, learn how to download videos from YouTube, learn how to convert .pdf to word, learn how to edit videos to expose work, carry out questionnaires to evaluate digitally, simultaneously with colleagues who are at home, practice sending emails.

The target groups of adults learners (18-to-60 year-olds) of various origins (Spain, Morocco, South America, Romania…); previous level to secondary school 15 students.

Students who cannot attend the face-to-face lessons can do that online (through Zoom) or mobile phones. The students always had to write (they could not send audios; because the teacher's mobile phone had little capacity). Likewise, they would send the exercises solved through a photo through the WhatsApp and she would return them corrected. A day or two before having the lesson on specific content, she sent it through the WhatsApp group to read it beforehand because they couldn't do a collective simultaneous reading.

Name and description of the selected initiatives/good practice	Neuronal Fitness

The project aimed to prevent absenteeism as well as provide students with digital basic knowledge and study techniques; encourage group dynamics (reduced by the social distance imposed by COVID-19), since they allow to create links, facilitate social integration and improve their self-esteem and empathy; promote and encourage their personal and educational interests to achieve success in their studies; value the multiculturalism and diversity of the world that surrounds them to develop as citizens respectful of others and the environment.

The specific objectives that are pursued with the inclusion of digital training in the project are summarized as follows:

- scanning and sending PDF files via mobile phone;
- training students in the use of the EducaMadrid Virtual Classroom: access and registration with a specific code for uploading materials and its later correction by the teacher;

- learn to edit videos and use PowerPoint;
- accessing to EducaMadrid email and replying to messages.

The target groups of adults learners at the level of secondary school.

The tutor teacher of each of the eight groups that make up face-to-face secondary education in our school has been responsible for developing the group dynamics and training their students in the practice of digital skills since this teacher is in charge of providing them with the email accounts and access codes to the Virtual Classroom and guide them on this technological route.

The tutor teacher evaluates the results through an online survey completed by students in Levels I and II of secondary education.

5. DEFINITION OF THE PROJECT-BASED LEARNING FRAMEWORK FOR BUILDING CLASSES 2.0 IN ADULT EDUCATION

5.1 Project-based learning approach for adult education

Project-Based Learning is a rather broad range of student-centred teaching strategies inspired by constructivist pedagogical practices.

One of the main features of this approach is tied to the problem-solving strategies which, as Schmidt (Schmidt H. G., 1993) stated, encourage the activation of the foreknowledge necessary for the initial analysis of the problem, on the search for new helpful information starting from the activated foreknowledge, the restructuring by each student of the knowledge shared with colleagues and on the elaboration of semantic networks of new meanings.

This means that the learning process results are strongly contextualized and based on students' curiosity, discovery, and enunciation of new problems. In the end, knowledge derives from social construction.

Project-Based Learning is referred to the set of practices is characterized by a greater focus on design or research (usually collaborative...) effectively and operational solutions to the initial problem, aiming if possible to concrete applications or trying to build "products" that make sense of the analysis carried out, systematically using new technologies.

The theoretical paradigm of Project-based Learning, besides including some aspects of constructivist philosophy from Schank to Papert, to Resnick, comes from the theories on the active involvement and motivation of students (Kearsley G. et alii, 1999) and those more oriented to the enhancement of differences in learning styles and especially of the multiple "intelligence" (Gardner H. E., 1983). Overall, it is a set of structured methodologies closer to the school's reality, often more attracted by the "active" dimension of educational experiments. Project-Based Learning is spreading, especially in the university and adult education (where there are some favourable conditions, in particular, greater autonomy and critical ability by students...), mainly thanks to the systematized work done by BIE (Buck Institute for Education[15] - Figure 17) and also supported by Microsoft[16].

[15] The BIE has been active in this area since 1987 (http://www.bie.org.) The BIE also manages the most important online resource repository on Project Based Learning (http://www.pbl-online.org/. [Retrieved online 16/03/2021]

[16] Microsoft's project is aimed at schools around the world, through partnerships with local stakeholders and institutions. In Italy it was carried out in collaboration with Giunti Editore and started in 2006 (Did@tic project). The first phase is oriented to the training of high school teachers: the first online courses to start the PBL methodology were attended by 2500 teachers, which are being added another 1000-2000 through further dissemination actions curated by IRRE.

Figure 17. Gold Standard Project Based Learning by PBLWorks
Source: https://www.pblworks.org/what-is-pbl

Project-Based Learning, or PBL, is an instructional approach built upon learning activities and actual tasks that have brought students challenges to solve. These activities generally reflect the types of learning and work people do in the everyday world outside the classroom. PBL is usually done by groups of students working together toward a common goal. PBL teaches students not just content but also essential skills in ways students have to function as adults in our society. These skills include communication and presentation skills, organization and time management skills, research and inquiry skills, self-assessment and reflection skills, group participation and leadership skills, and critical thinking. Performance is assessed on an individual basis and considers the quality of the product produced, the depth of content understanding demonstrated, and the contributions made to the ongoing process of project realization. PBL allows students to reflect upon their ideas and opinions and make decisions that affect project outcomes and the learning process in general. The final product results in high-quality, authentic products and presentations.

Among the PBL advantages, some of them are listed as follows:

- puts students in a position to use the knowledge that they get;
- effective in helping students understand, apply, and retain the information;
- can allow students to work with professional experts who enrich and support the teachers' knowledge and how it connects to the real world;
- can be more effective than traditional instruction, and increase academic achievement;
- benefits include building skills such as critical thinking, communication and collaboration;
- students who work on projects show increased motivation and engagement in their studies.

The innovation of the project-based approach is based on its emphasis on cooperative learning. Additionally, students create tangible results to represent what they have learned. Students use technology and inquiry to respond to a complex issue, problem or challenge. PBL focuses on student-centred inquiry and group learning, with the teacher acting as a facilitator instead of the one in charge. Activities match as nearly as possible the real-world tasks of professionals in practice rather than classroom-based tasks. This encourages interdisciplinary perspectives and enables learners to play diverse roles and build expertise that is applicable beyond a single well-defined. Lastly, it allows a range and diversity of outcomes open to multiple solutions, rather than a single correct response obtained by applying predefined rules and procedures.

The main features of the Project-based learning approach can be synthesized as follows:

- organized around a problem or challenge without a predetermined solution;
- creates a need to know of essential content and skills;
- students design the process of reaching a solution;
- requires critical thinking, problem-solving, collaboration, and various forms of communication;
- provides the opportunity for students to examine the task from different perspectives using a variety of resources, separate relevant from irrelevant information, and manage the data they gather;
- students learn to work independently and take responsibility when they are asked to make choices;
- students regularly reflect on what they're doing;
- a final product (not necessarily material) is produced and is evaluated for quality,
- the classroom has an atmosphere that tolerates error and change;
- the teacher takes on a facilitator's role rather than a leader since the project-based learning approach creates a "constructivist" learning environment in which students construct their knowledge.

5.1.1 Project-Based Learning scenarios construction

To construct the project-based learning scenarios effectively, the five key features underlined by Krajcik and Blumenfeld's (2006) will help approach PBL in a constructivist manner by designing and building authentic projects to use in the classroom. They are the following:

1. Identifying a unique challenge or problem;
2. Investigating the challenge using the inquiry process and applying ideas in the discipline;
3. Exploring the ideas and challenge them through collaborative activities;

4. Utilizing the inquiry process to refine products;
5. Developing the summative product addressed to the challenge or problem, and publically shares it.

Identifying a unique challenge or problem - Learners begin by exploring a unique challenge that is authentic and relevant to their needs (Laur D. et alii, 2017). Specifically, it is important to connect your curriculum to either a career or out into your school, local, state, national, or global community to produce an authentic challenge (Laur D., 2013).

Investigating the challenge using the inquiry process and applying ideas in the discipline - The discipline or disciplines are what the students engage with to develop their ideas into solutions. Therefore, the use of the discipline's academic language, application of standards, and knowledge of content is imperative to the authentic challenge's structural design.

This step starts with an essential question that will launch the PBL scenario. It will open-ended because students will tackle the challenge or problem given, knowing no one answer or solution.

It has to be taken from a real-world topic and, then, students will be able to begin an in-depth investigation. The best way is to prepare the question about a relevant and meaningful issue for students.

Exploring the ideas and challenge them through collaborative activities - Group work in PBL means collaborative learning where learners cultivate, justify, argue, and recognize multiple perspectives on an issue to create the most appropriate and viable products. The PBL process entails individual and group dynamics to help the learner make meaning from the content and process to articulate that meaning.

One example is to involve them in project planning. In this way, they will feel ownership of the project because they are actively involved in decision making.

This step is focused on the selection of the activities that support the question and utilize the curriculum. The suggestion is to integrate as many subjects as possible into the project and define what materials and resources will be accessible to the students to assist them. Teachers should be prepared to delve deeper into new topics and new issues that could arise as they become increasingly involved in the active pursuit of answers.

Utilizing the inquiry process to refine products - The inquiry process reflects the complex social situations that experts go through while solving problems and innovating new products. As students develop their products, the continuous refinement process is what elicits higher quality work from them. The refinements students complete are based on feedback from their peers and teachers' guidance.

It would be better for this stage to create a timeline to carry out the project work. Although changes will be made to the schedule, students need to finalize their thoughts, findings, and evaluations.

Before starting the project work, teachers should know the answers to the following questions:

- What time allotment will be given to the project?
- Will this project be conducted during the entire school day or during dedicated blocks of time?

- How many days will be devoted to the project?

All the students should meet with success through their projects' development and, for this reason, they should be allowed to go in new directions but guided them when they appear to digress from the project. When a group seems to be going in a different direction, it is always important to ask the students to explain their actions. They may have an insight into a solution you haven't seen.

Developing the summative product addressed to the challenge or problem and publically shares it - The main aim of PBL is to solve real-world challenges through questions, investigations, analyses, drawing conclusions, and finally, the presentation of findings to an authentic audience. Modelling, coaching, and scaffolding combined throughout a project help the students acquire the content and skills needed to reflect on and articulate their final solutions.

An important step is the monitoring and evaluation of the project realized. It will take place through a process of both team and project rubrics creation.

"As the number of ideas to consider or the number of procedures that need to be followed increases, students may need to stay organized, track their progress, and maintain a focus on the problem rather than get confused by its elements" (Blumenfeld P. C. et alii, 1991).

While the "team rubrics" state each team member's expectations by replying to the questions on the group dynamics - *How well are the members participating? How engaged are they in the process?* - the project rubrics reply to other inquiries - *What is required for project completion? What is the final product? What does a good report, multimedia presentation, poster, or other product look like?.*

In any case, the requirements should be clear to all students to all meet with success.

After the delivery of the final product, the assessment step has to be taken place. It provides diagnostic feedback by allowing one to evaluate progress and relate that progress to others.

On the one hand, it gives students feedback on how well they understand the information and what they need to improve. On the other hand, it helps the teacher design instruction to teach more effectively.

"Project-based learning is focused on teaching by engaging students in investigation. Within this framework, students pursue solutions to nontrivial problems by asking and refining questions, debating ideas, making predictions, designing plans and/or experiments, collecting and analysing data, drawing conclusions, communicating their ideas and findings to others, asking new questions, and creating artefacts (e.g., a model, a report, or a computer program)" (Blumenfeld P. C. et alii, 1991).

This phase can be associated with the opportunity for students to conduct self-assessment and peer-review in their class.

5.1.2 Project-Based Learning framework application

In the face of the several challenges of the digital world, trainers should support the development of problem-solving skills associated with the use of technologies. Problem-solving skills could be considered from the following two important aspects: on one side, they are meant as the capacity of solving technological issues; on the other side, they refer to the ability to propose technical solutions for the problems of everyday life. Both aspects are identified in the DIGCOMP framework. The problem-solving skills associated with digital technologies include solving technical problems from trouble-shooting to solving more complex issues; identifying needs and technological responses through the critical evaluation of possible solutions; creatively using technology for multimedia production; and expressing oneself.

Project-based learning is the approach focused on the opportunity to put social and emotional learning (SEL) into practice (Weissberg R. P. et alii, 2015). This is an essential aspect for both children and adults during their learning process. Social and emotional learning (SEL) is an integral part of education and human development. SEL is the process through which people acquire and apply the knowledge, skills, and attitudes to develop healthy identities, manage emotions, achieve personal and collective goals, feel and show empathy for others, establish and maintain supportive relationships, and make responsible and caring decisions. Therefore, a project-based learning approach focused on SEL will allow developing the “personal, social and learning to learn competence” of the EU framework for Key Competencies and, in the case of BoostClass 2.0 project, digital competences.

PBL works well in collaborative contexts when learners work in groups on their projects. Therefore, a culture of collaboration in the classroom is improved among the students who start to work together by sharing common goals. Their success depends on the participation of all the members.

Besides, the PBL approach includes improved learning strategies and thinking skills development.

Learning to learn: Effective online projects encourage students to work on a problem in-depth rather than covering many topics briefly.

Students also learn what is needed to solve a problem or complete a project, rather than when the teacher decides on a predetermined curriculum. Both of these strategies are cited in educational reform literature as being important tools to improve learning.

Learning by making approaches are recommended to promote this type of skill and digital media offers several opportunities to engage adult learners in the creative process of multimedia production. Making an artefact such as the multimedia resume, which was the aim of the previously mentioned Links-up workshop, allows trainees to get involved in learning by doing activities requiring learners to confront technical challenges and be creative and express themselves.

Lifelong Learning: Web projects build learning experiences connected to the learning one does throughout life, rather than only on "school" subjects. By using the real tools for intellectual work used in the

workplace, rather than oversimplified textbook techniques, students become familiar with the kinds of knowledge that exist. Finding information and people on the Internet gives students the ability to acquire the knowledge they may need.

Through the promotion of trial-and-error learning processes, serendipity and abductive reasoning, and learning by doing, trainers may encourage adult learners to improve their digital competences both for active citizenship and as a means for continuous professional development and learning.

Active learning: people learn best by "doing." In a well-designed Web project, students work in a hands-on mode with the physical world. They gather information and data, explore, create, experiment, physically manipulate things, and organize information. They have access to people and information from the real world, and they develop a closer relationship to the real-world context of problems and projects. The connections to real people, events, and problems in the world bring relevance and connection that is immediate and involve their interest, intellect, and participation.

Cooperative learning encourages active engagement by the students in learning, and it also builds critical skills needed in today's workplace. Online projects increase the audience and opportunity for cooperative learning by involving and communicating with a wide selection of people worldwide. Students work directly with people from other places and cultures and collaborate with peers and mentors, and experts in many fields.

Successful project-based learning (PBL) seeks to develop learning models blending classroom teaching, technology use, and problem-solving through projects and real-world challenges.

In this context, PBL develops 21st-century skills such as collaboration, communication, and critical thinking and digital skills.

The use of technology enhances PBL, and PBL enhances comfort with technology in three ways:

Using realia to make the lesson real

"Realia" is a fancy word for when teachers/educators use real-life stuff for teaching aids, for example, the dissection in a biology class or tasting foods mentioned in a short story. All of them are realia.

Realia aims to connect what students are learning in the class to actual life outside.

With PBL, it's very helpful for students to see realia before working on their projects. Educators/teachers should do everything they can to help students forget that they're working on an assignment and engage them in creating something real.

For example: by allowing students to use Chromebooks or tablets or some sort of internet-connected device, you can open up an entire world of realia for your students. If your project is for students to design a zoo, give them time to go online to research real floor plans for natural zoos.

This helps students understand the real-life implications of their project, and it also develops digital literacy as students search online for the results they want.

Creating opportunities for communication and collaboration

The internet has already changed the way people communicate with each other for work, and it's bound to continue changing it in the future. Already, there's a movement called "digital nomads" of people who live anywhere they want because they work entirely online. In the end, people might all be digital nomads.

PBL lessons are the perfect place to increase your students' digital literacy by practising online communication skills. Students should brainstorm and communicate in person to learn how to share positively as a team, both in-person and online modality.

For example: consider setting up an online channel for your students to collaborate on a project as homework. Applications like Trello or Asana are real workflow apps that businesses use to manage projects, and they happen to be perfect for project-based lessons as well. Groups within LMS can also be powerful tools for communication and collaboration, allowing members to work together to create shared resources and post updates (with videos, links, and polls).

Using these kinds of apps helps students work more efficiently and get experience using professional management tools. Of course, it will be important for the educator to monitor communication over these channels, just like it's important for an educator to monitor small groups when working in class.

Showcasing what's been learned

One of the most important parts of any PBL lesson comes at the end when students put their project on display. Showcasing their work instils students with a sense of pride, and it encourages other students. Additionally, it can add a sense of ownership to a project when you tell students that they will display their creation once it's complete.

Example: display student projects around the school or to a public outside. The best way is to share projects online. This is an element of PBL that directly correlates to students' future careers. Out in the workforce, people need to create great projects and prove the work they've accomplished.

By proving the work they've done, students are not only taking pride in their work beyond treating it as an assignment, but they're also showing an authentic understanding of the material.

Table 28. PBL and technology: some examples

Technology	Objective	Teacher role	Students role
Learning Management System	To communicate easier course contents to students.	– Editing the course contents as the learning project proceeds. – Flexible pedagogy. – Collecting learner data across different activities.	All learning activities that students undertake outside the classroom can be recorded into a Learning Record Store (LRS).
Flipped Classroom	– Making learners independent in their learning. process – Favouring meaningful learning. – Encouraging learners to express their creativity.	Providing learners with basic instructions before class through, e.g. videos.	Using instructional materials before class, the classroom discussion would be better focused on problem-solving and critical thinking, encouraging an attitude of sustained inquiry.
Video Quiz	– Reinforcing the achievement of learning objectives. – Consolidating knowledge.	Integrating quizzes into online videos after a course topic is discussed.	– Integrating quizzes into online videos after a course topic is discussed. – Helping learners master the core content through problem-solving activity. – Increasing students' time on the task and encouraging more time for practice. – Organizing more productive classroom discussions
Whiteboard Animation Videos	Explaining complex concepts to learners.	Using animation tools for whiteboard, such as VideoScribe and Adobe After Effects.	– Verbal cues guide learners through the concept. – The visual part enables them to create a map of the new knowledge.
Web Quest	Collecting information from the internet through a teacher-led process.	Posing an initial real problem to be solved.	Designing a solution in the form of a critical presentation of the results obtained by searching, comparing and selecting resources and information.

Another relevant step for the PBL approach implementation is the final assessment and review at the end of the process.

There are many ways how you can assess the students' progress in a PBL context. However, peer assessment (Topping K. J., 2009) is most used in a collaborative environment because it provides a structured learning process for students to critique and provide feedback on their work. It helps students

develop lifelong skills in assessing and providing feedback to others and equips them with self-assess and improving their work.

It can (i) empower students to take responsibility for and manage their learning; (ii) enable students to learn to assess and give others constructive feedback to develop lifelong assessment skills; (iii) enhance students' learning through knowledge diffusion and exchange of ideas; (iv) motivate students to engage with course material more deeply.

Since a PBL activity is focused on a real-life problem and provides an authentic context, audience assessment can also play an important role. An original PBL activity should go beyond the classroom, including a wider audience for the final product presentation.

However, any PBL activity includes setting goals and assessment criteria right from the start. Once you have decided on the final assessment criteria, project rubrics can be a great way to support this task. They are multidimensional and allow teachers to include a range of criteria in a structured and organized way. Besides, rubrics can be created and adapted to different projects and then easily exploitable.

CONCLUSION AND FINAL FINDINGS

This outcome has described how integrating new technologies in adult education is implemented and promoted effectively in Europe and the partner countries by showing several good best practices realized.

The findings coming from the investigation realized show that digital competencies are relevant in both teaching and learning processes in adult education. They still require resources and tools to improve and master them autonomously both from teachers and students' perspectives.

Considering six DigiCompEdu Framework areas focus on different aspects of educators' professional activities: 1. Professional Engagement; 2. Digital Resources; 3. Teaching and Learning; 4. Assessment; 5. Empowering Learners; 6. Facilitating Learners' Digital, the following areas for teaching improvement have been found:

Table 29. Areas for teaching improvement

Competence Area	Topic	Activity
Professional Engagement	- Organisational communication. - Professional collaboration. - Digital continuous professional development. - Reflective practice	- To use digital technologies to enhance organisational communication with learners. - To use digital technologies to develop educational resources collaboratively. - To seek targeted training and use opportunities for continuous professional development. - To use the internet to update one's subjects specific competences. - To use online training opportunities, e.g. video tutorials, MOOCs, webinars etc.
Digital resources	- Selecting digital strategies. - Creating and modifying digital resources. - Managing, protecting and sharing digital resources.	- To formulate appropriate search strategies to identify digital resources for teaching and learning. - To assess the usefulness of digital resources in addressing the learning objective, competence levels. - To combine and mix existing digital resources or parts thereof, where this is permitted. - To modify and edit existing digital resources where this is permitted. - To create new digital educational resources. - To share resources on online platforms or personal or organisational websites/blogs.
Teaching and Learning	- Teaching - Guidance	- To use classroom technologies to support instruction, e.g. electronic whiteboards, mobile devices. - To interact with learners in collaborative digital environments. - To structure the lesson, different (teacher-led and learner-led), digital activities reinforce the learning objective. - To set up learning sessions, activities and interactions in a digital environment. - To structure and manage content, collaboration and

		interaction in a digital environment.
Assessment	- Assessment technologies - Feedback and planning	- To use digital assessment tools to monitor the learning process and obtain information on learners' progress. - To use digital technologies to enhance formative assessment strategies, e.g. using classroom response systems, quizzes, games. - To use digital technologies to enhance summative assessment in tests, e.g., computer-based tests, implementing audio or video (e.g. in language learning), using simulations or subject-specific digital technologies as test environments. - To use digital technology to grade and give feedback on electronically submitted assignments. - To use digital technologies to scaffold learners' assignments and their assessment, e.g. through ePortfolios.
Empowering Learners	- Accessibility and inclusion - Actively engaging learners	- To provide equitable access to appropriate digital technologies and resources, e.g. ensuring that all students have access to the digital technologies used. - To use digital technologies to visualise and explain new concepts in a motivating and engaging way, e.g. by employing animations or videos. - To select appropriate digital technologies for fostering active learning in a given learning context or for a specific learning objective. - To employ digital technologies and strategies, e.g. assistive technologies, designed for learners' in need of exceptional support (e.g. learners with physical or mental constraints; learners with learning disorders). - To employ digital learning environments or activities that are motivating and engaging, e.g. games, quizzes.
Facilitating Learners'	- Digital content creation	- To create and edit digital content in different formats. - To create new, original and relevant content and knowledge. - To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.

The possibility to promote and implement the integration of new technologies in adult education effectively is found in encouraging an innovative teaching approach such as the project-based multimedia learning, which meant a teaching method in which students acquire new knowledge and skills during designing, planning, and producing a multimedia product (Simkins M. et alii, 2002).

Thanks to project-based learning, adult learners can acquire new knowledge and digital skills related to the seven key dimensions: core curriculum, real-world connection, extended time frame, decision making, collaboration, assessment, and multimedia.

According to the Buck Institute for Education (BIE) (Thomas J. W. et alii, 1999) vision, all students (including adult learners) should have access to high-quality project-based learning (PBL) to deepen their learning and

achieve their success in all the life fields. This is allowed by the fact that the potentialities of PBL are to inspire learners to think differently about themselves as learners, collaborators and leaders through the development of critical thinking, problem-solving, collaboration, communication and self-management skills.

This guarantees teachers to make a difference in their learners' lives—academically, socially and emotionally— and experience the joy of teaching by promoting educational equity and empowering youth and adult furthest from opportunity.

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