Boosting Classes 2.0 for high-quality teaching in adult education

Ref. 2020-1-IT02-KA204-079329

Report on digital skills and technologies in adult education

COUNTRY Bulgaria

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Elaborated by	CPIA Formia EU-TRACK
Activity related	**O1/A1 -** Analyzing and comparing the teaching and learning approaches. **O1/A2** - Identification and mapping of the digital skills required for the integration of the technology into the classes for adult education at the national level. **O1/A3 -** Analyzing and comparing the assessment and evaluation systems in distance learning (formative and summative) through the specific tools and techniques at the national level.
Deliverable No. and title	**O1 - Framework to integrate new technologies in adult education through project-based learning**

Contents

INTRODUCTION

The actual document represents the elaboration of the data revealed utilizing the questionnaire aimed at defining the framework to integrate new technologies in adult education through project-based learning. In total 25 answers were processed. The responses are grouped according to the corresponding activities related:

- Analyzing and comparing the teaching and learning approaches;
- Identification and mapping of the digital skills required for the integration of the technology into the classes for adult education at the national level;
- Analyzing and comparing the assessment and evaluation systems in distance learning (formative and summative) through the specific tools and techniques at the national level.

The sample analysed is characterized 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 summarized in Figure 1 below.

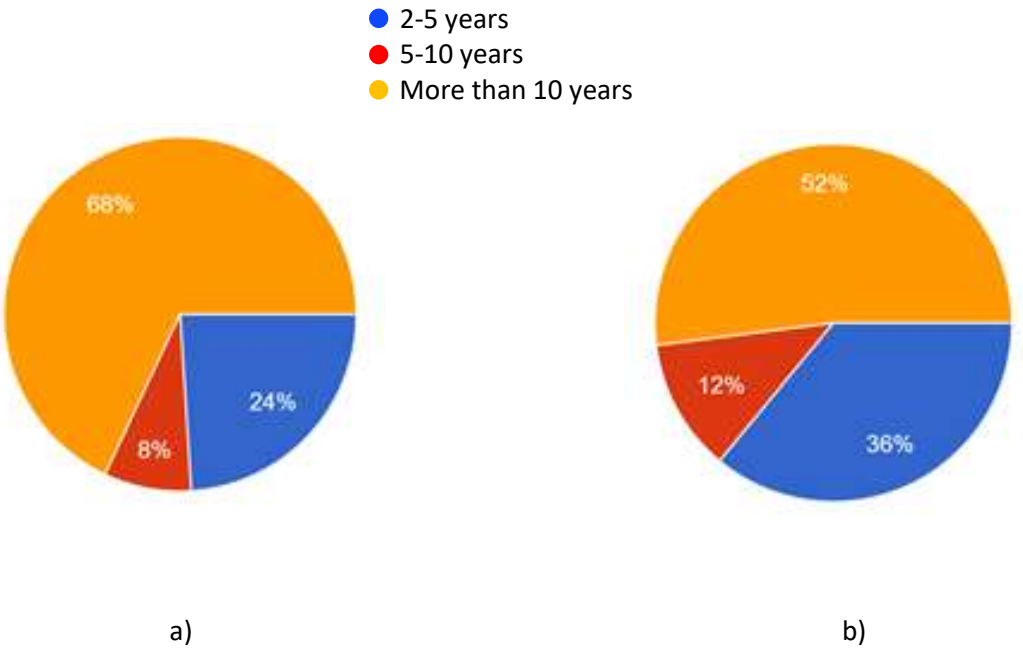


Figure 1. Professional experience in teaching: a) general; b) in the adult field.

The main percentage of respondents have significant experience in teaching (Figure 1a, 68%), more than half of them have accumulated experience in adult education (Figure 1b, 52%). Among the subjects taught, 20 people indicated the specialties 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 10 years, the awareness of the problems related to the field regarding the organization of the institution and the reached users is realized. The lists, presenting both weaknesses and strengths, confirm the above:

Weaknesses - individualized skills-based qualifications - demonstration of skills in competency tests and personalization of tests, e.g. completion of only one module, not 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 of knowledge.

1. The teaching and learning approaches for the use of technologies in the classroom in adult education in Bulgaria

Regarding the teaching tools used during face-to-face lessons, the answers revealed can be divided into two main groups: traditional and innovative. While the first group consists mainly of traditional materials such as demonstration, frontal talk, textbooks, debate, seminar; the second is composed of various innovative tools such as brainstorming, panel discussion, electronic lessons, digital technologies.

In response to the question related to the type 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. In addition, the following approaches are summarized below:

- Brainstorming, role-play
- Project assignments, individual research assignments
- Interactive methods, Situational methods - Case study, Method of specific situations (case studies); Discussion methods - talk, discussion.
- Digital technologies - e-learning, web tutorials, presentations, videos, e-tests, computer models of real objects, e-crosswords, games. Inverted classroom.
- Practical tasks, laboratory exercises

As to the instruments used to encourage student's learning, again the variety of the answers received is quite similar to the ones received during the previous inquiries, but in addition, 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, specialized textbooks on the subject.
- Internet platforms, educational software
- Models
- Training boards

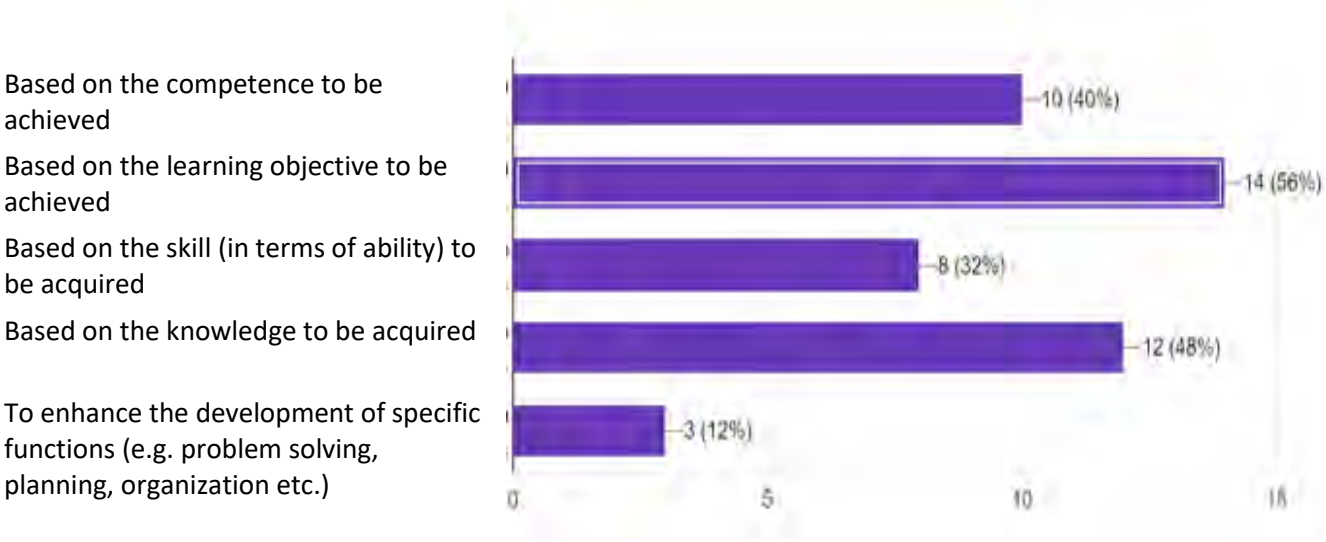


Figure 2 - How do you select a teaching resource for your students?

While choosing the learning resource for students, as shown by the relevant survey (see Figure 2), the majority of 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, which are given by 12% of respondents.

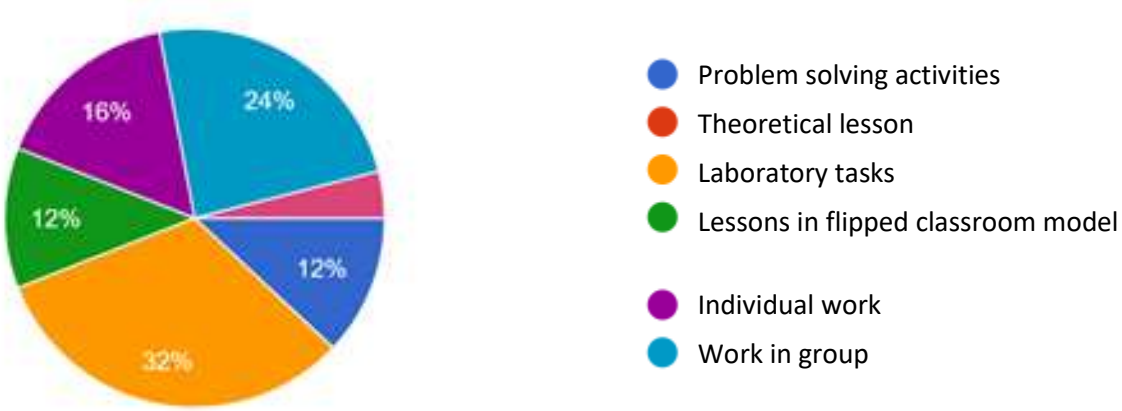


Figure 3 – The most suitable method with your students.

When asked about the best method for your students, a large percentage of respondents (32%) answered "laboratory tasks". This is due to the fact that the respondents are teachers - engineers, teaching disciplines in vocational training.

Behind the reflections for those who consider "group work" as an appropriate teaching method, 13 respondents answered in the affirmative. Distribution as a ratio for group work as a basis for developing relationships or learning is reflected below.

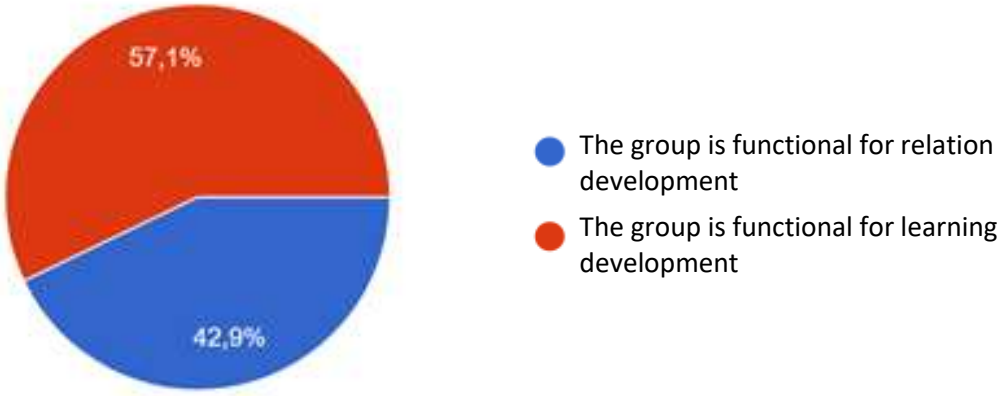


Figure 4 – The most suitable method with your students.

Thus, according to the answers received, the group is considered more functional for the development of relationships compared to the development of learning.

As regards the monitoring tools for the learning level achieved the following options have been registered:

- 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

Criteria for assessing student performance:

- Volume of acquired new knowledge
- Volume of old knowledge to come into use
- Understanding the new material.
- Active participation
- Ability to analyze 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

2. The digital skills required for technology integration into the classes in the classroom

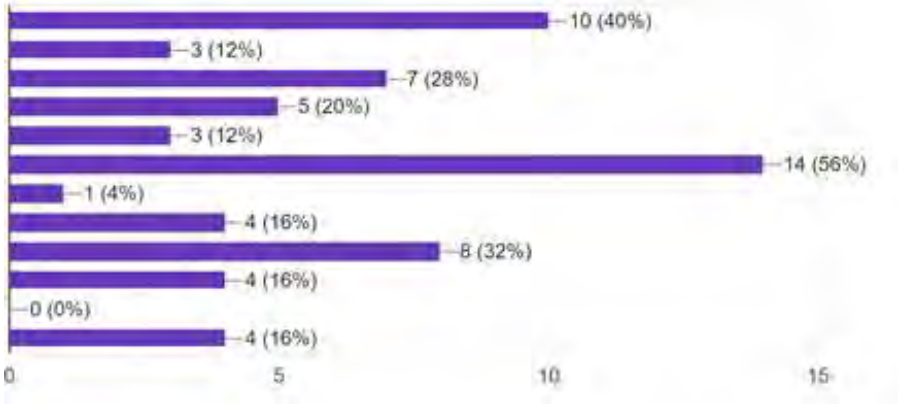
The absolute majority (88%) do use digital tools during teaching activities. First of all, as the results demonstrate, the use of a digital instrument is pre-defined by objective one wants to reach. Therefore, the instruments specified are miscellaneous:

- Computer, tablets
- Electronic tests. electronic platforms and applications
- Multimedia, electronic modules, measuring instruments
- Google Tools
- Simulation software products
- Electronic textbooks, tests, videos
- Specific softwareInteractive tools, digital resources
- Learning platforms

Below the results acquired on the base of the questionnaire aimed at defining the most pertinent digital skills (shown in red, orange and yellow, Fig. 5-10) followed by the summarizing table (see Table 1), containing the selected ones with the corresponding areas are represented.

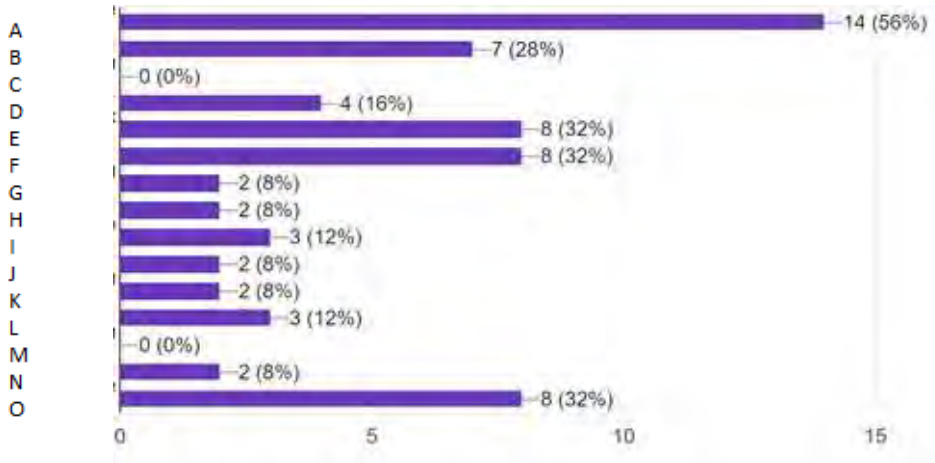
A - To use digital technologies to enhance organisational communication with learners.
B - To use digital technologies to collaborate with other educators.
C - To use digital technologies to collaboratively develop educational resources.
D - To seek the help of others in improving one's digital and pedagogical practice.
E - To seek targeted training and use opportunities for continuous professional development.
F - To use the internet to update one's subjects specific competences.
G - To use the internet to learn about new pedagogical methods and strategies.
H - To use online training opportunities, e.g. video tutorials, MOOCs, webinars etc.

Figure 5 – Professional development and reflective practice area.



A - To formulate appropriate search strategies to identify digital resources for teaching and learning.
B - To critically evaluate the credibility and reliability of digital sources and resources.
C -To assess the usefulness of digital resources in addressing the learning objective, competence levels.
D - To modify and edit existing digital resources, where this is permitted.
E - To combine and mix existing digital resources or parts thereof, where this is permitted.
F - To create new digital educational resources.
G - To understand different licences attributed to digital resources and the implications for their re-use.
H - To share resources using links or as attachments, e.g. to e-mails.
I - To share resources on online platforms or personal or organisational websites/blogs.
J - To respect possible copyright restrictions to using, re-using and modifying digital resources.
K - To attribute (open) licenses to self-created resources.
L - To take measures to protect sensitive data and resources (e.g. students' grades, exams).
M - To formulate appropriate search strategies to identify digital resources for teaching and learning.

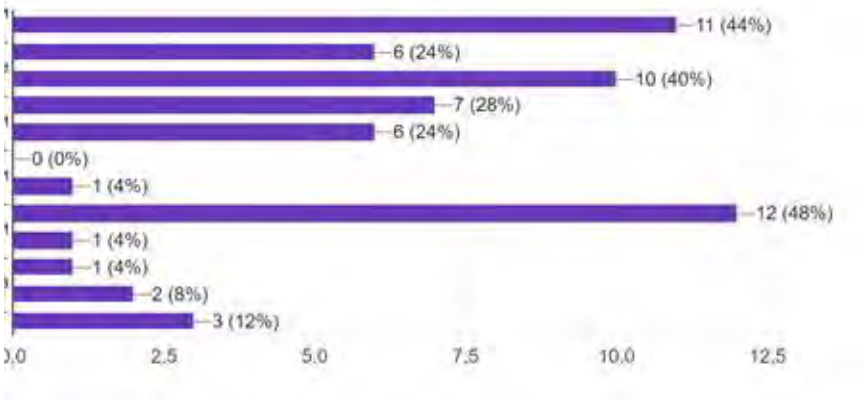
Figure 6 – Digital resources area.



A - To use classroom technologies to support instruction, e.g. electronic whiteboards, mobile devices.
B - To structure the lesson so that different (teacher-led and learner-led) digital activities jointly reinforce the learning objective.
C - To set up learning sessions, activities and interactions in a digital environment.
D - To structure and manage content, collaboration and interaction in a digital environment.
E - To consider how educator-led digital interventions – whether face-to-face or in a digital environment - can best support the learning objective.
F - To use digital communication tools to respond promptly to learners' questions and doubts, e.g. on homework assignments.
G - To set up learning activities in digital environments, having foreseen learners' needs for guidance and catering for them.
H - To interact with learners in collaborative digital environments.
I - To digitally monitor student behaviour in class and offer guidance when needed.
J - To implement collaborative learning activities in which digital devices, resources or digital information strategies are used.
K - To implement collaborative learning activities in a digital environment, e.g. using blogs, wikis, learning management systems.
L - To use digital technologies (e.g. blogs, diaries, planning tools) to allow learners to plan their own learning.
M - To use digital technologies to allow learners to collect evidence and record progress, e.g. audio or video recordings, photos.
N - To use digital technologies (e.g. portfolios, learners' blogs) to allow learners to record and showcase their work.
O - To use digital technologies to enable learners to reflect on and self-assess their learning process.

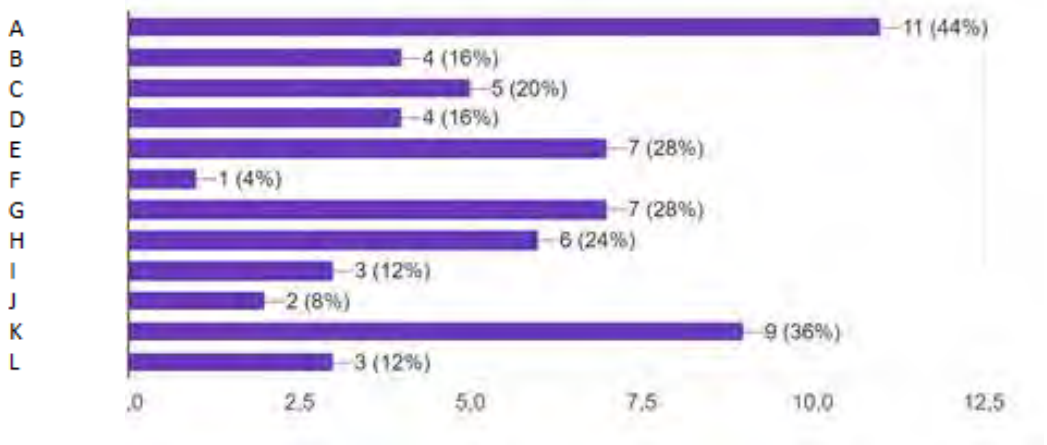
Figure 7 – Teaching and learning area.

A
B
C
D
F



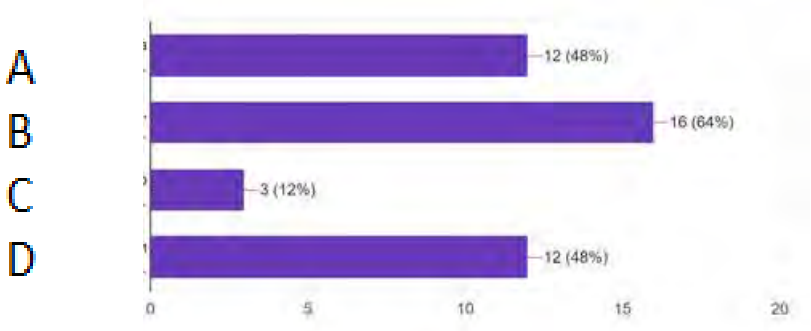
A - To use digital assessment tools to monitor the learning process and obtain information on learners' progress.
B - To use digital technologies to enhance formative assessment strategies, e.g. using classroom response systems, quizzes, games.
C - To use digital technologies to enhance summative assessment 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.
D - To use digital technologies to scaffold learners' assignments and their assessment, e.g. through ePortfolios.
E - To use a variety of digital and non-digital assessment formats and be aware of their benefits and drawbacks.
F - To critically reflect on the appropriateness digital assessment approaches and adapt strategies accordingly to technologies as test environments.
G - To use digital technologies to record, compare and synthesize data on learner progress.
H - To use digital technology to grade and give feedback on electronically submitted assignments.
I - To use digital technologies to monitor learner progress and provide support when needed.
J - To adapt teaching and assessment practices, based on the data generated by the digital technologies used.
K - To enable learners to evaluate and interpret the results of formative, summative, self- and peer-assessments.
L - To assist learners in identifying areas for improvement and jointly develop learning plans to address these areas.

Figure 8 – Assessment area.



A - To provide equitable access to appropriate digital technologies and resources, e.g. ensuring that all students have access to the digital technologies used.
B - To select and employ digital pedagogical strategies which respond to learners' digital context, e.g. contextual constraints to their technology use (e.g. availability), competences, expectations, attitudes, misconceptions and misuses.
C - To employ digital technologies and strategies, e.g. assistive technologies, designed for learners' in need of special support (e.g. learners with physical or mental constraints; learners with learning disorders).
D - To consider and respond to potential accessibility issues when selecting, modifying or creating digital resources and to provide alternative or compensatory tools or approaches for learners with special needs.
E - To employ design principles for increasing accessibility for the resources and digital environments used in teaching.
F - To continuously monitor and reflect on the suitability of the measures implemented to improve accessibility and adapt strategies accordingly.
G - To use digital technologies to visualise and explain new concepts in a motivating and engaging way, e.g. by employing animations or videos.
H - To employ digital learning environments or activities which are motivating and engaging, e.g. games, quizzes.
I - To put learners' active uses of digital technologies at the centre of the instructional process.
J - To use digital technologies to allow learners to actively engage with the subject matter at hand, e.g. using different senses, manipulating virtual objects, varying the problem set up to enquire into its structure, etc.
K - To select appropriate digital technologies for fostering active learning in a given learning context or for a specific learning objective.
L - To reflect on how suitable the different digital technologies used are in increasing learners' active learning, and to adapt strategies and choices accordingly.

Figure 9 – Empowering learners



A - To create and edit digital content in different formats.
B - To create new, original and relevant content and knowledge.
C - To understand how copyright and licenses apply to data, information and digital content.
D - To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.

Figure 10 – Facilitating learners' digital competence area.

Table 1 - Summary of the skills selected with the corresponding areas.

Skills	Area
• *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.*	Professional development and reflective practice
• *To formulate appropriate search strategies to identify digital resources for teaching and learning.* • *To create new digital educational resources.*	Digital resources
• *To use classroom technologies to support instruction, e.g. electronic whiteboards, mobile devices.*	Teaching and learning
• *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 use digital technology to grade and give feedback on electronically submitted assignments.*	Assessment
• *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.*	Empowering learners
• *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.*	Facilitating learners' digital competence

3. The assessment and evaluation systems in distance learning (both formative and summative) in Bulgaria

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

- Handling equipment, the level of their digital literacy
- Dealing with digital technologies
- Uncertainty about one's own 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

The results show, that the organization 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 a competition
- Solving problems
- Online testcт
- Individual research tasks; work on a project group task
- Video materials

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

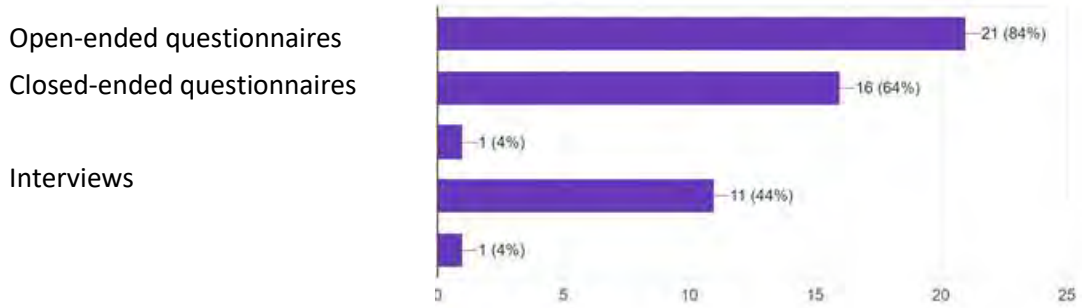


Figure 11 - Online evaluation tools.

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

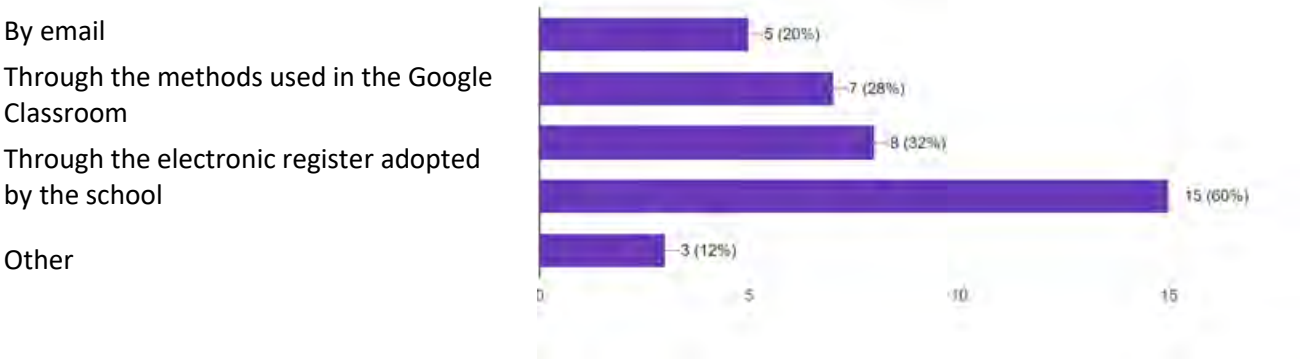


Figure 12 - Online assessment administration and revision management.

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.

4. The two good practices of educational performance selected in Bulgaria and aimed at adult students

4.1 Description of the first good practice

Name and description of the selected project/good practice	"Simulation software products - transition from theory to practice in training in digital circuitry."
Describe the *ratio* of the choice	Educational environment supported by technology.
What are the main objectives of the selected educational activity? In terms of learning experiences and knowledge.	Educational Upbringing Developing The discipline "Applied Software" is studied in 11th grade, II grade. term with hours 36 uch. o'clock. The aim is to construct and test a model for improving the quality of knowledge in theory and skills in practice for the types of schemes through their virtual implementation. Application software products are used, with the help of which the students draw the schemes, connect measuring instruments to them, measure their parameters and fill in protocols with the reported results.

Please, specify the referred adult sector	• vocational training services

Target audience description (e.g. age, foreign adults; the initial competences held, etc.)	11th and 12th grade students, independent form of education, qualification courses.

Description of the competences to be achieved with this good practice (max 2 competences)	The formation of professional competencies in the subject is based on the acquisition of knowledge and skills related to the selection of appropriate application software in order to structure, process and present information.

Considering each competence selected, describe the following areas:	
COGNITIVE AREA	focusing on creative and exploratory experiences; reinforcing the relationship between doing and thinking
AFFECTIVE– EXPRESSIVE AREA	reinforcing expressive experiences; promoting the self-expression; supporting the expression of feelings, emotions and sensations
SOCIAL AREA	encouraging socialization and social relationships; focusing on relational and interactive "experiences"; encouraging interpersonal communication, discussion, collaboration, participation and team working
Psychomotor (if relevant)	satisfying the movement needs through simulation activities

The contents/ knowledge taught / learned	The simulation training method is characterized by the following advantages: - A scheme is realized and studied by simulation within one to two school hours, ie. - there is about four times higher efficiency than the practical implementation; - Through simulation the practical acquisition of skills increases up to 50% of the theoretical knowledge; - Students learn to use software products that have a real application in business. Once graduated, they are more competitive in the labor market; - The implementation and research of a scheme significantly increases the level of knowledge in theory - from knowledge, understanding, memorization to application, analysis, synthesis, even creativity; - The interest of students in technology increases, they acquire complex knowledge and skills in the form of games, compete with each other, "leaders of knowledge" appear; - The results are observed immediately, the scheme has flexible parameters - students can change the values and type of elements and observe the change in the principle of operation of the scheme. This is practically impossible because it requires a large elemental base, repeated attempts and tens of times more time than we have; - Errors are removed immediately without burning real elements and rework everything;

	- When a scheme is constructed and studied by simulation, in practice many less mistakes are made in its actual implementation; - 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.

Description of the features of the online environment used	„Proteus 8.3” 1. The schemes are illustrated instead of multimedia on a screen shared by the teacher; 2. When it comes to writing on a board, I use two options: - The whiteboard in the platform we work with - MS Teams; - The Paint 3D application in Windows 10, which gives much greater opportunities for this purpose. 3. With the help of the teacher, students install the application software “Proteus 8.3” on their home computers;

Which is the typology of the lesson implemented?	Individual study, synchronous activity, pre-prepared teaching resources by teachers

Are the teaching activities and contents, managed in the online environment, disciplinary or multidisciplinary?	multidisciplinary

What are the learning outcomes?	• To know the methodology for designing electronic circuits; • To know the main features of the software product; • To be able to create new components; • To be able to design an electronic circuit; • To know the types of analyzes when simulating the operation of electronic circuits; • To know the rules for designing printed circuit boards. • To add text and graphics; • To be able to check and edit the scheme;

	• To be able to perform different types of analyzes when simulating the operation of electronic circuits; • To be able to evaluate the obtained result; • To be able to check and eliminate errors; • Be able to create source files and reports

How, in this good practice, was evaluated the learning outcomes of the students?	individual assessment, presentation of simulation, questionnaires submissions, demonstration

4.2 Description of the second good practice

Name and description of the selected project/good practice	**Basics of Operational amplifiers**
Describe the *ratio* of the choice	teaching practice, group work
What are the main objectives of the selected educational activity? In terms of learning experiences and knowledge.	- Educational goals– adopting new practical and theoretical skills about operational amplifiers. Learning how to use them in actual circuits. Practicing measuring both current and voltage using a multimeter. - Developing – develop a logical way of thinking and the ability to come to a conclusion. Forming the ability to pay attention and to self asses. Learning how to work in a team, obeying the safety rules and having discipline.

Please, specify the referred adult sector	vocational training services

Target audience description (e.g. age, foreign adults; the initial competences held, etc.)	11th and 12th grade students, independent form of education and qualification course.

Description of the competences to be achieved with this good practice (max 2 competences)	With the execution of the topic the students will understand how the operational amplifiers work. They will be able to successfully analyze it in given schematics.

Considering each competence selected, describe the following areas:	
COGNITIVE AREA	increasing curiosity; focusing on creative and exploratory experiences; reinforcing the relationship between doing and thinking
AFFECTIVE– EXPRESSIVE AREA	reinforcing expressive experiences; promoting the self-expression; supporting the expression of feelings, emotions and sensations
SOCIAL AREA	encouraging socialization and social relationships; focusing on relational and interactive "experiences"; encouraging interpersonal communication, discussion, collaboration, participation and team working
Psychomotor (if relevant)	simulation activities

The contents/ knowledge taught / learned	The subject studies basic concepts, elements and devices of electronics, analog, digital circuitry and pneumatic automation. Acquire practical skills for consolidation and correct application of theoretical knowledge.

Description of the features of the online environment used	First, 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 better illustrate the explanations. It allows part of the screen to be highlighted, thus directing students' attention to the desired location.

Which is the typology of the lesson implemented?	Working in group, synchronous activity, asynchronous activity, pre-prepared teaching resources by teachers

Are the teaching activities and contents, managed in the online	multidisciplinary

environment, disciplinary or multidisciplinary?	

What are the learning outcomes?	• the ways of connecting the individual measuring devices in the circuit setting; • basic concepts in the field of electronic measurements; • the type, device, principle of operation, characteristics, parameters and application of the electronic elements; • the ways of recording the characteristics of the semiconductor elements and the analog circuits; • the ways for recording oscillograms and determining the main parameters of the signals on the recorded oscillograms;

How, in this good practice, was evaluated the learning outcomes of the students?	class assessment; presenting learning scenarios/simulations

5. The curriculum in the school o be integrated with the project methodology and tools

5.1 Description of the curriculum selected

Curriculum title	Mechatronics

Please, specify the referred adult sector	• vocational training services

Target audience description	11th and 12th grade students, independent form of education, qualification courses

Description of the competence to be achieved. (only 1 competence)	The professional competencies in the subject are formed by acquiring knowledge and acquiring skills for: methods and means for research of electronic elements and circuits from the analog and digital circuitry

Considering the competence selected, describe the following areas:	
COGNITIVE AREA	focusing on creative and exploratory experiences; reinforcing the relationship between doing and thinking
AFFECTIVE– EXPRESSIVE AREA	reinforcing expressive experiences; promoting the self-expression; supporting the expression of feelings, emotions and sensations
SOCIAL AREA	encouraging socialization and social relationships; focusing on relational and interactive "experiences"; encouraging interpersonal communication, discussion, collaboration, participation and team working
Psychomotor (if relevant)	simulation activities

Please, describe the prerequisites of the students. (e.g. prior knowledge, skills, abilities, etc.)	The training in the subject is carried out in mutual connection with the subjects of the obligatory general education preparation mathematics and physics and astronomy and with the subjects of the obligatory professional training electrical engineering and electronics, hydraulics and pneumatics.

What are the teaching resources (both online and in face-to-face modality) used for this curriculum?	

How is the acquired competence evaluated in this curriculum?	presenting learning scenarios/simulations; questionnaires submissions; interviews