CIRCVET

CIRCULAR ECONOMY PRACTICAL TRAINING MATERIALS
FOR PLASTIC MANUFACTURING INDUSTRIES

Deliverable 1.5 – Assessment system for C-VET and itineraries.

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1. Executive summary.

CircVET is an innovative project which aims to design and develop training materials, to provide new skills for people working in the plastic manufacturing sector. The project envisages carrying out methods to teach and learn using MOOCs (Massive Open Online Courses) in the learning environment, providing an instructor from the cluster and the training center along the entire process for each individual student.

A set of courses developed by the consortium will be integrated with training modules combined following individual needs, through the cooperation between higher education and vocational education and training (VET), research, the business sector, and the public sector. The CircVET project introduces the building of new teaching and learning materials using a certification system, connect with the Circular Economic model, with an extra effort on the plastic sector.

The teaching methodology implemented in the course is the Flipped Classroom. It is a pedagogical model in which the instructor shares predetermined digital resources with students (prerecorded lectures, prescribed reading, interactive videos, simulations cases...) related to the content, through a platform outside the classroom, before the class. This information will be analyzed, studied, and understood. During the classroom, the activities developed will be focused on solving doubts, on collaborating in teamwork and discussion, or on applying and reinforcing what has been learnt[1]. The advancement of this methodology is to offer the students opportunities to develop critical and independent thinking and improve their learning processes through interaction with their peers[2]. Details of this methodology, as well as how to implement it could be found in deliverable 1.1.

This document is a part of the CircVET Activities of the WP1, the T1.3 “Itineraries and paths for needs” and aims at bridging a developed assessment system, for C-VET, allowing tailored itineraries through e-learning platform according to identified needs of training. With this in mind, we propose an assessment system and itineraries option to better address the needs of training of the students.

[1] M.C. Ruiz-Jiménez, R. Martínez-Jiménez, A. Licerán-Gutiérrez and E. García-Martí. The International Journal of Management Education, 20 (2022) 100635.
[2] F.M. Otero-Saborido, A.J. Sánchez-Oliver, M. Grimaldi-Puyana and J. Álvarez-García. Education + Training, 60 (2018) 421-430.

2. Glossary of terms[3], abbreviations, and acronyms.

Partner short name	
P1-AIJU	Partner 1 – ASOCIACIÓN DE INVESTIGACIÓN DE LA INDUSTRIA DEL JUGUETE CONEXAS Y AFINES (Spain)
P2-CENTIMFE	Partner 2 – CENTRO TECNOLÓGICO DA INDÚSTRIA DE MOLDES, FERRAMENTAS ESPECIAIS E PLÁSTICOS – CENTIMFE (Portugal)
P3-KIMW-Q	Partner 3 – Gemeinnützige KIMW-Quaòifizierungs GmbH (Germany)
P4-POLYMERIS	Partner 4 – POLYMERIS (France)
P5-PROPLAST	Partner 5 – Consorzio per la promozione della cultura plastica – PROPLAST (Italy)
P6-LINPRA	Partner 6 – LIETUVOS INZINERINES PRAMONES ASOCIACIJA LINPRA (Lithuania)
P7-ULPGC	Partner 7 – Universidad de las Palmas de Gran Canaria (Spain)
P8-IDL	Partner 8 – Infinitivity Design Lab (France)
P9-APRC	Partner 9 – ALYTAUS PROFESINIO RENGIMO CENTRAS (Lithuania)
P10-UNITR	Partner 10 – Università degli Studi di Trento (Italy)
P11-HIT	Partner 11 – HUB INNOVAZIONE TRENTINO – Fondazione (Italy)
P12-VPM	Partner 12 – VISAGINO TECHNOLOGIJOS IR VERSLO PROFESINIO MOKYMO CENTRAS (Lithuania)

Abbreviation	Name
C-VET	ACTIVE PROFESSIONAL
KPIs	KEY PERFORMANCE INDICATORS
MOOC	MASSIVE OPEN ONLINE COURSE
VET	VOCATIONAL EDUCATION AND TRAININ

Assessment methods

The whole range of written, oral, and practical tests/examinations, projects, performances, presentations, and portfolios that are used to evaluate the learner's progress and ascertain the achievement of the learning outcomes of an educational component (unit/module).

[3] CTS users' guide 2015: https://op.europa.eu/en/publication-detail/-/publication/da7467e6-8450-11e5-b8b7-01aa75ed71a1 (access February 2023).

Assessment criteria

Descriptions of what the learner is expected to do and at what level, to demonstrate the achievement of a learning outcome. The assessment methods and criteria for an educational component must be appropriate and consistent with the learning outcomes that have been defined for it and with the learning activities that have taken place.

Qualification

Any degree, diploma, or other certificate issued by a competent authority attesting to the successful completion of a recognized program of study.

Student-centred Learning

A learning approach characterized by innovative methods of teaching which aim to promote learning in communication with teachers and students and which takes students seriously as active participants in their own learning, fostering transferable skills such as problem-solving, and critical and reflective thinking[4].

3. Introduction.

The present document constitutes Deliverable D1.5 "Assessment System for C-VET and Itineraries", in the framework of the WP1 of Methodology and Curricula. The present document will be divided into two sections: (i) the definition of the systematic criteria that will be used in the course as assessment methodology and (ii) the procedure applied to customize the itineraries with the aim to identify the best options of course following the needs of each person.

The first aim that is relevant to consider is the election of the assessment methodology applied in the course, in accordance with the teaching methodology used, the Flipped Classroom. The assessment is a core component of effective learning. It is important to highlight that during the teaching-learning process, learners provide opportunities to demonstrate their developed abilities and receive support to enhance their acquired knowledge.

In this sense, there are different types of assessment to be used in the class: diagnostic, formative, summative, ipsative, norm-referenced and criterion-referenced assessments. The major forms of assessment that exist are diagnostic (pre- and post-instruction to collect data on what students already know about the topic), formative (assessment to support learning) and summative (for validation and accreditation) assessment. The purpose of the diagnostic assessment (also known as pre-formative assessment by some authors) is to measure students' knowledge, skills, strength, and weaknesses beforehand, to improve the level of teaching and learning. On the other hand, the summative assessment has been the conventional form of assessment and the formative assessment has an alliance with the activities embedded contained by a process to create learning opportunities. In the case of

[4] The European Students' Union: https://esu-online.org/wp-content/uploads/2016/07/ESU-Activity-Report-2010.pdf (acess in february 2023).

online formative assessment, following Gikandi et al.[5], it is described by diverse approaches that allow an improvement of the understanding skills and outcomes.

- The fundamental issue of assessment:
  - *Validity*: the grade to which the assessment activities and processes promote further training.
  - *Reliability*: the degree to which what is evaluated is sufficient to measure the level of knowledge structure being developed.
  - *Dishonesty*: relates to confirming the real identity of the learner.
- The functionality of online formative assessment
  - Formative and immediate feedback.
  - Engagement with the critical learning process.
  - Promoting equitable education.

At this point, it is important to mention the significance and benefits of the formative assessment. Formative assessment can be understood as the process in which a teacher provides evidence to students during the learning process. The idea is to adapt their understanding, management, and regulation[6], to promote the feedback with the aim to improve their teaching practice and the teaching-learning process performed within the classroom. Another consideration that it is important to emphasize is the positive effect in terms of the efficient use of formative feedback. Some points that it is possible to highlight with good practice of the feedback using this methodology are:

1. Encouraging positive motivational beliefs.
2. Providing the development of self-assessment during the learning.
3. Improving permanent learning strategies.
4. Supporting opportunities to close the gap between current and needed performance.
5. Developing personal and professional talents.
6. Creating more responsibility in the students.
7. Preferring the understanding of the student's learning processes.
8. Allowing the involvement of teachers and the progressive improvement of their teaching practice.
9. Helping to clarify academic performance in subject areas in which this type of assessment system is implemented, in terms of goals, criteria and expected standards.
10. Delivering high-quality information to students about their learning.

However, a negative factor that is important to consider is the initial difficulties in the implementation of this methodology, mainly because of the differences with other assessment systems and if it is not well-elaborated, students and instructors could have a perception of excessive workload.

[5] J.W. Gikandi, D. Morrow and N.E. Davis. Computers & Education, 57 (2011) 2333-2351.
[6] V.M. López-Pastor and A. Sicília-Camacho. Assessment & Evaluation in Higher Education, 42 (2017) 77-97.

4. Aims of the deliverable.

With this in mind, this deliverable aims to define the process for the assessment of the itineraries used in the e-learning platform with the goal to identify the needs of training for C-VET courses implemented in the CIRCVET project framework.

5. Assessment methodology.

Before defining the assessment methodology, or rather which methodologies, will be implemented in the course, it is important to understand the meaning of this word. The word "assessment" comes from the Latin term *ad- + sedere* and means "to sit down"[7]. It implies that when someone assesses he/she is getting down to the same students' level, to provide them with supported information. In a flipped learning environment, students have the possibility to improve the process to learn, nevertheless, it is the assessment that unlocks the strategies to success.

In an educational model based on the Flipped Classroom methodology, we must consider assessment as a tool for personalization, differentiation, and individualization[8]. When we talk about personalization, we refer to assessment as learning, i.e., the learning starts with the learner. They understand how to become active participants in designing their learning goals along with the teacher and take the responsibility for their learning. In other words, they are motivated and challenged as they learn so they work harder than their instructor. In terms of differentiation, the instructor provides instructions to groups of learners based on their challenges in a specific content area and their skill levels. This implies that teachers carry out regular assessments after which they provide feedback to the students in order to advance their learning. Finally, individualization refers to the teacher identifying the learner`s needs through evaluations based on their challenges. Teachers carry out an assessment which serves to evaluate what students know and what they do not know.

The next stage is to define how evaluation should be considered. In the introduction, three assessment methodologies have been defined: diagnostic, formative and summative. It should be noted that this deliverable proposes the use of these assessment methods in the teaching-learning process based on the flipped learning methodology. Nevertheless, the most significant and important method to be employed in this model is the formative one, mainly because this approach consists of identifying the performance of the students while carrying out the assigned tasks and projects. While the summative assessment measures the final performance of the students, therefore, it is commonly applied at the end of the didactic unit or the project.

As already mentioned, the implementation of the Flipped Classroom methodologies leads to broader assessment models than the traditional ones. In other words, the most important thing is not only to check what the students know and what they do not understand but also to specify what they are able to do with what they have learned. With all previously mentioned, the CircVET project's purpose is to use a strategic combination of these different methodologies to be used as an assessment methodology.

[7] Online Etymology dictionary: https://www.etymonline.com/ (access February 2023).
[8] B. Bray and K. McClaskey. Personalization vs. Differentiation vs. Individualization Report (PDI) v3. Amherst (2018).)

5.1. Diagnostic assessment.

The diagnostic assessment focuses on the level and kind of knowledge that students present before starting that course or subject. In the CircVET project, the diagnostic evaluation will be implemented as a methodology to allow tailored itineraries through the e-learning platform according to identified needs of training for the C-VET public. In other words, it will be used as an instrument to guide or direct the real requirements of students following the previous knowledge. The main aim of the application of the necessary evaluation procedure is to determine the specific needs of the students and with the results acquired by the personalized course definitions, a course will be defined for each applicant, combining the information and training. Further details related to the itinerary procedure will be seen in section 6.

5.2. Formative assessment.

The concept of formative assessment was introduced by Michael Scriven (1967) and originally it was used as a complement to summative assessment, with the purpose to develop a self-regulated learning process[9]. In summary, it could be understood as a practice in which, during the learning process, the students with the intention to adjust their management and understanding of the course content, receive instructions from the lectures to improve their knowledge.

Regards the formative assessment, a universal principle was identified to practice this methodology: (i) define clear learning goals; (ii) guide the students in their learning; (iii) involve students in the learning process, self-evaluation, and assessment; (iv) provide feedbacks; (v) find a balance in the time regards to the assessment and the course; (vi) assist the students to make sound decisions with the information of the assessment; and finally (vii) build schemes that validly improve student performance.

With this in mind, this deliverable suggests, under pedagogical and didactic measures, to use some of the following instruments to analyze the students' progress. At this point, it is important to mention that the formative assessment will be the central process of evaluation used in the courses elaborated inside of the CircVET project.

- classroom surveys with concise questions and answers,
- quick tests to measure the level of knowledge,
- oral and practical tests/examinations,
- performance presentations,
- portfolios,
- class discussion,
- group projects to stimulate discussion and observe the level of understanding,
- checklists to demonstrate the successful learning from training,
- progress reports,
- virtual classroom tolls (e.g., Kahoot![10]),
- projects,
- practical examples/exercises

[9] V.M. López-Pastor and A. Sicília-Camacho. Assessment & Evaluation in Higher Education, 42 (2017) 77-97.
[10] Kahoot! | Learning games | Make learning awesome! (accessed in February 2013).

In this sense, mainly based on the definition of the goals achieved by the students, this deliverable proposes to use rubrics as key competence to favor and facilitate the evaluation of students. The rubrics are different levels of performance quality criteria, which describe a set of goals to be achieved by the students. To enhance student performance, there are several approaches for the formative use of rubrics, such as increasing transparency, allowing the students to have the knowledge of what is exactly expected from him/her, facilitating the feedback process, and supporting self-efficacy and self-regulation of students[11]. The rubric consists of a table explanation, determining the learning goals achieved by the student, for each one of the issues/modules elaborated in D1.3. The application of this process is uncomplicated and three essential aspects are considered for each purpose:

1- whether the learner has learned (yes),
2- whether learning is in progress (in progress),
3- whether the learner has not learned (no).

Each criterion could be determined by a score and according to the rating, the final grade for this assignment is determined.

In the assessment process three aspects are important to contemplate: didactic learning objectives of the module (the goals expected to attain at the end of the educational process, which should be measurable and quantifiable); methodology (methodological strategy used to accomplish this objective); and evaluation criteria (to evaluate the degree to which this objective is reached). The use of assessment tool (e.g., Google Analytics®) could be helpful in this stage.

Once all the parameters have been defined, the next goal is to know how to understand or apply the assessment. The first step is to define the expected learning outcomes and the strategies used for assessment in order to achieve the proposed aim. Then, for each expected learning outcome to be assessed, a percentage of the score is assigned. This point is subdivided into different stages, e.g., from a-e, and classified into basic, intermediate, and advanced. Finally, for each of these phases (a-e), a new distribution (in percentage) is realized and the expected key performance indicators (KPIs) are made. In the following **Figure 1**, an evaluation model for an expected learning outcome is shown.

[11] E. Panadero and A. Jonsson. Educational Research Review, 9 (2013) 129-144.

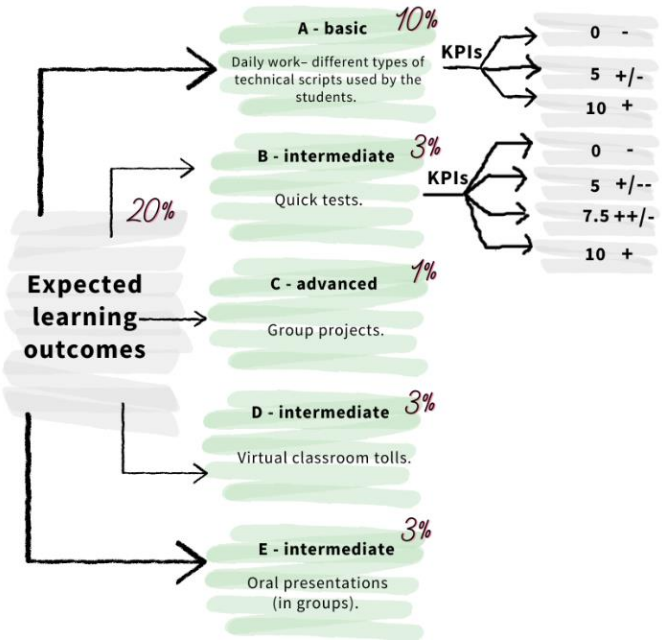

Figure 1. An example of score distribution for one expected learning outcomes.

5.3. Summative assessment.

As referred to in the introduction section, the formative assessment is most frequently used for the Flipped Classroom methodology. Moreover, this does not exclude the use of other methodologies as the diagnostic or summative. The summative assessment is used in order to determine the skills acquired by the student through his/her performance in relation to the aims and/or predefined skills for a provided content. Usually, it is performed at the end of a teaching-learning process and is interconnected to the certification outcomes of the degree of mastery of abilities, and the achievement obtained from students.

The function of summative assessment is to evaluate the learning acquired by a student at the end of the the teaching-learning process. It can be done through:

- written test/examination,
- practical test/examination,
- oral test/examination,
- performance,
- standardized assessment,
- a final project,
- a podcast,
- practical examples/exercises

Within the scope of the CircVET project, summative assessment could be used as an approach to evaluate the knowledge acquired by the student at the end of each module, if the instructor agrees to take advantage of it.

6. Tailored itineraries.

Finally, the CircVET approach is to start from the detected real needs in the companies, the existing and required knowledge, and skills of the people working in, and to evaluate the individual needs of an applicant in order to build up a personalized training (**Figure 2**).

To reach the proposed target it is projected to employ the diagnostic methodology.

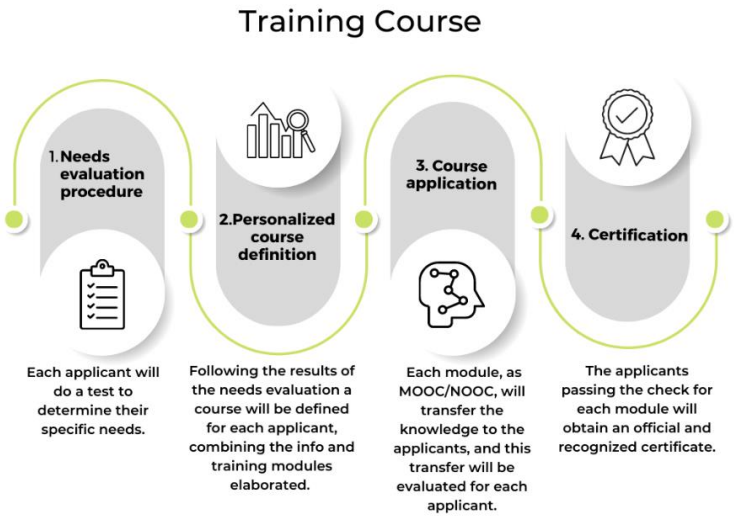

Figure 2. Scheme of the built-up personalized training.

To be able to carry out a diagnostic assessment, it is essential to have the appropriate instruments, and in this sense, the measuring instrument that could be used for this purpose is an online questionnaire. The questionnaire shall be fit to assess the previous knowledge and skills of the future student. Based on the results, the e-learning platform will design a specific itinerary for each student addressing them to the specific modules and topics in which they need to enroll, and which modules and topics they can skip. This is especially important for C-VET students since they respond to a profile of a person who needs to achieve certification in a short period of time and would not appreciate investing time in concepts that already control.

With this in mind, a questionnaire or short quiz will be developed containing all the course content, that will be available to all C-VET target audiences interested in the course.

When the potential students perform the questionnaire, according to the answers obtained as well as the score, the course will be directed to the modules for which the interested party has not obtained a favorable qualification.

The other purpose of the questionnaire/quiz is to be used to assess the knowledge acquired by the students after they have studied the different modules.

As an internal requirement to ensure that the students have taken profit form of the course, the marks will be given in two parts: first, the students will have to pass a series of evaluations along each module (continuous evaluation). Secondly, after completing each

module, the students will need to pass a general evaluation test with questions from each topic included in the curricula of the module. A minimum mark of 5 out of 10 is the requirement to pass the test.

6.1. Curricula evaluation

CircVET also considers the possibility of designing tailored itineraries based on the curricula of the students. Beyond the questionnaire previously described, the students will count with the possibility of applying for a knowledge recognition process.

For this, the deliverable D2.2, which includes all training modules, will count with a knowledge recognition and validation chart matching previous training and professional experience with topics, sections, and chapters of each module.

Based on the charts, the experts mentoring students will evaluate the suitability of recognizing previous knowledge and, thereby, some students will be allowed to skip either whole modules or parts of them.

The online platform will be programed to skip already recognized modules in the itineraries design.

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