



R3.3. GUIDELINES FOR INNOVATIVE LEARNER-CENTRED VET



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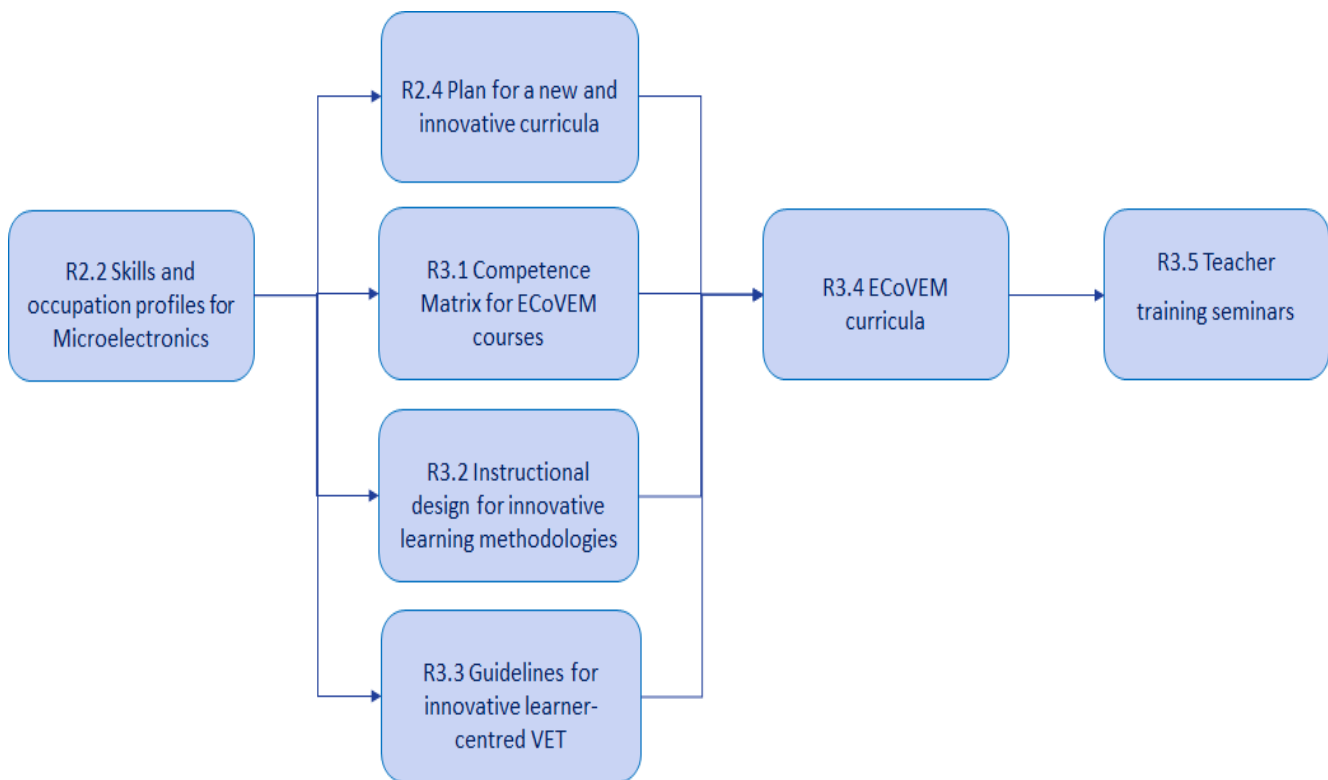


1. Introduction

1.1 Background information

The objective of these guidelines is to serve as recommendations for course developers to be implemented during the development of the ECoVEM curricula.

ECoVEM curricula will be obtained through several analysis and studies done as part of the results of work package 2 and 3 following this structure:



These guidelines are connected to the *Plan for the new and innovated VET curricula* as part of the deliverable R.2.4 and the innovative teaching methodologies identified and explained on the deliverable R. 3.2. *Instructional design for innovative learning methodologies* as the most suitable in the field of VET in Microelectronics, Electronics and their applications.



The deliverable 2.4 aimed at designing a plan of the curricula in microelectronics that will be further developed in the ECoVEM project, for the skills and occupational profiles that have been identified and analysed in the project.

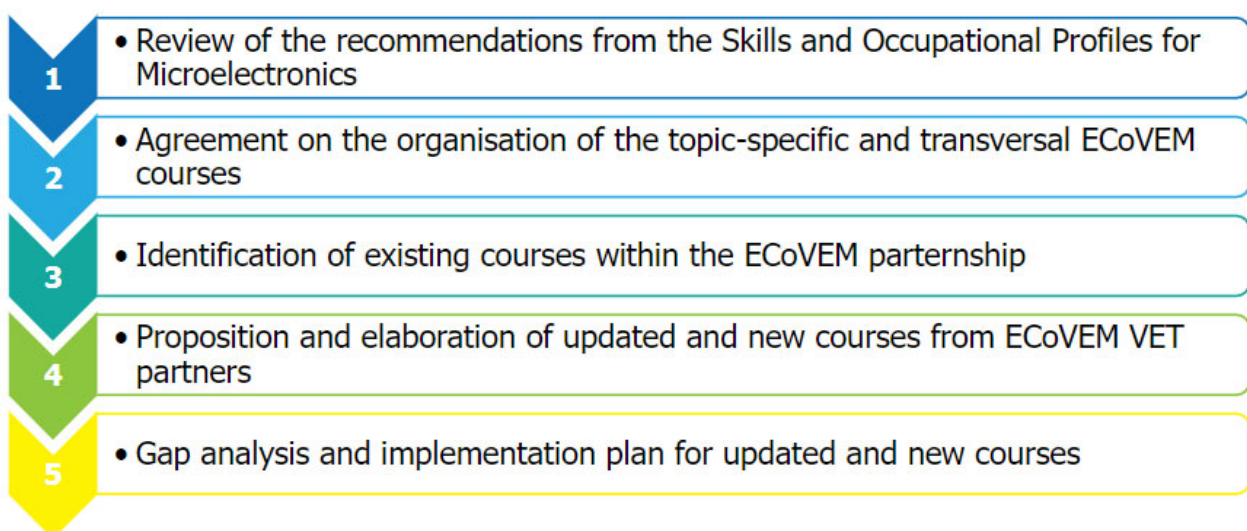
This preliminary plan has identified 7 main course categories for the ECoVEM curriculum, divided as follows:

- Course category #1 -Design and fabrication of printed circuit boards (PCB)
- Course category #2 -Microelectronics packaging technologies
- Course category #3 -Integrated Circuits Design
- Course category #4 -System design
- Course category #5 -Basics of microelectronics manufacturing
- Course category #6 -Microelectronics for greener economy and industrial applications
- Course category #7 -Key Competences & Transversal Skills.

For each category, courses were proposed by the ECoVEM VET partners, with a dedicated volume of training materials, EQF focus, and the corresponding syllabi have been elaborated. In total, 28 courses were proposed by 10 ECoVEM partners, for further elaboration and development in WP3.

A number of recommendations was elaborated for the proposed implementation of the courses, in terms of content of the modules, volumes of course, EQF focus and adaptation to the ECoVEM learning methodology.

The methodology used on the result 2.3 in order to obtain VET curricula was as follows:





Based on the outcome of the Skills and Occupational profiles' analysis, the initial list of ECoVEM courses, as it was elaborated at the very beginning of the ECoVEM project, was updated and the structure of the courses was agreed.

On the other hand, deliverable 3.3. aimed at systematizing modern innovative educational technologies and methods for teaching learning content in the context of the ECoVEM project. The use of these technologies in the design and development of the courses provided in work package 3 (WP3) will increase the motivation of students to study the curriculum, as well as improve their performance in the work environment to apply knowledge and skills needed for their daily work in microelectronics and its applications. For these reason, these innovative technologies should also be taken into account during the development of ECoVEM curricula.

The innovative learning methodologies identified and described in R.3.2 and developed in the courses are as follows:

- Performance-centred approach and Electronic Performance Support Systems
- Innovation in instructional design
- Project-Based Learning
- Activity Based Learning
- Simulation Based Learning
- Remote and Virtual Laboratories
- Blended Learning
- Microlearning
- Open educational resources (OER)

The method selected for each course depends on the best way of interaction between the "teacher-student", "student-teacher" and best strategies to be followed in order to improve academic outcomes and address real problems to promote equitable learning.

The development of ECoVEM curricula intends to incentive students and learners in microelectronics making them the central and substantial element of the teaching process.

Several factors have been considered to identify the best learning methodology for the development of the ECoVEM courses:

- **The goals and objectives of the course:** What do you want students to learn and be able to do by the end of the course? What skills, knowledge, and abilities will be most important for them to develop?
- **The characteristics of the students:** Who will be taking the course? What are their backgrounds, experiences, interests, and learning styles? What are their goals and aspirations?



- **The content and structure of the course:** What topics will be covered in the course, and in what order? How will the course be organized and delivered (e.g., in-person, online, blended)?
- **The resources and support available:** What resources (e.g., materials, equipment, facilities) will be available to support student learning? What support (e.g., tutoring, mentoring, guidance) will be available to help students who need extra help?
- **The context and constraints of the course:** What are the broader contextual factors (e.g., political, economic, social) that may affect the course and student learning? What constraints (e.g., time, budget, availability) may limit the options for the course?

Based on these factors, it may be possible to identify a learning approach that is well-suited to the course and the students. Microelectronic courses, for instance, might benefit from a hands-on, experiential learning approach that allows students to work on real chips and learn by doing. Ultimately, the best learning approach will depend on the specific goals, context, and needs of the course and the students

After the consideration of the above-mentioned factors, learner-centred approaches were identified as the teaching method to be followed by course developers to achieve the purpose and goals of the ECoVEM project.

Based on these factors the datasheets with the information required of the courses developed by partners were elaborated as part of WP3. The datasheets asked for the following information:

Course Title	
Course Platform	
Course Web	
Access Information	
Provider Institution	
Provider Contact	<i>name</i> <input type="text"/> <i>email</i> <input type="text"/>
Teachers	
Type Of Course	<input type="checkbox"/> On-line (stand-alone) <input type="checkbox"/> On-line (tutored) <input type="checkbox"/> Visio



	<input type="checkbox"/> Work-based training <input type="checkbox"/> On-site training <input type="checkbox"/> Hybrid on-site/on-line <input type="checkbox"/> Other (specify):
Dates Opening	Expected
Dates Availability	
Workload Student (In Hours) (Workload Must Include Face To Face Classes, Hours Of Study, Time To Complete Activities, Videos, Evaluation, Assessment, Etc. In Short, Any Time Spent By The Student In The Course)	
ECTS (25-30 student hours)	
ECVET points (60 ECVET points one full year student)	
Type Of Training	<input type="checkbox"/> Initial VET <input type="checkbox"/> Continuous VET <input type="checkbox"/> Work-based training
EQF Levels	<input type="checkbox"/> EQF 3 <input type="checkbox"/> EQF 4 <input type="checkbox"/> EQF 5 <input type="checkbox"/> EQF 6 <input type="checkbox"/> EQF 7 <input type="checkbox"/> EQF 8
Languages	<input type="checkbox"/> English <input type="checkbox"/> Others (specify):
Main Subject	<input type="checkbox"/> Design and manufacture of PCB <input type="checkbox"/> Microelectronics packaging technologies <input type="checkbox"/> Integrated circuits design <input type="checkbox"/> System design



	<input type="checkbox"/> Fundamentals of microelectronics manufacturing <input type="checkbox"/> Microelectronics for a greener economy <input type="checkbox"/> Key competences and skills <input type="checkbox"/> Other (specify):	
Course Description		
Keywords		
Learning Objectives		
Prerequisites		
Learning Outcomes	<i>Knowledge:</i>	
	<i>Skills :</i>	
	Responsibility and Autonomy:	
Modules	<i>Module1</i>	
	<i>Module1</i>	
	<i>Module3</i>	
Materials	<input type="checkbox"/> <i>videos</i> <input type="checkbox"/> <i>Documents (pdf, doc)</i> <input type="checkbox"/> <i>Presentations (ppt)</i> <input type="checkbox"/> <i>Self-assessment activities</i> <input type="checkbox"/> <i>Auto-assessment activities</i> <input type="checkbox"/> <i>Tutored activities</i> <input type="checkbox"/> <i>Lectures (On-site)</i> <input type="checkbox"/> <i>Lectures (On-line)</i> <input type="checkbox"/> <i>Activities based on laboratory practices</i> <input type="checkbox"/> <i>Activities based on software simulations</i> <input type="checkbox"/> <i>Activities based on peer activities</i> <input type="checkbox"/> <i>Infographics</i>	



	<input type="checkbox"/> <i>Podcasts</i>
External Resources	<input type="checkbox"/> <i>Links to webs</i> <input type="checkbox"/> <i>Videos</i> <input type="checkbox"/> <i>Tutorials</i> <input type="checkbox"/> <i>Books/chapters</i> <input type="checkbox"/> <i>Journal articles/conference papers</i> <input type="checkbox"/> <i>Related/complementary modules/courses (links to other ECOVEM courses)</i> <input type="checkbox"/> <i>Other Free download worksheets on intercultural training: Teaching Culture, Intercultural Training Exercise Pack</i>
Assessment And Evaluation (Each module should have its own evaluation as well as the whole course)	Percentage of completion <input type="checkbox"/> <i>Assessment based on completion materials (videos, quizzes, etc.)</i> Auto-assessment tasks <input type="checkbox"/> <i>Fixed quizzes</i> <input type="checkbox"/> <i>Adaptative quizzes</i> <input type="checkbox"/> <i>Drag and drop activities</i> <input type="checkbox"/> <i>Video-quizzes</i> <input type="checkbox"/> <i>Virtual simulators</i> Peer assessment tasks <input type="checkbox"/> <i>Assessment based on peer activities</i> Self-assessment tasks <input type="checkbox"/> <i>Essay based on topics and providing a document as solution</i> <input type="checkbox"/> <i>Laboratory practices - laboratory work</i> <input type="checkbox"/> <i>Assessment based on software simulation activities</i> Teacher assessment tasks <input type="checkbox"/> <i>On-site examination</i> <input type="checkbox"/> <i>On-line examination</i> <input type="checkbox"/> <i>Laboratory practices - laboratory work</i> <input type="checkbox"/> <i>Assessment based on software simulation activities</i>
Home Image Of The Course (Jpg Or Png)	



<p>Innovative Learning Methodologies (We included in the Project Proposal the Performance-centered approach and gender and inclusive diversity)</p>	<ul style="list-style-type: none"> <input type="checkbox"/> <i>Performance-centered approach and Electronic Performance Support Systems</i> <input type="checkbox"/> <i>Innovation in instructional design</i> <input type="checkbox"/> <i>Project-Based Learning</i> <input type="checkbox"/> <i>Activity Based Learning</i> <input type="checkbox"/> <i>Simulation Based Learning</i> <input type="checkbox"/> <i>Remote and Virtual Laboratories</i> <input type="checkbox"/> <i>Blended Learning</i> <input type="checkbox"/> <i>Microlearning</i> <input type="checkbox"/> <i>Open educational resources (OER)</i>
<p>Internal Comments :</p>	



2. Learner- centred teaching approach

2.1. Concept

A learner-centred approach is a teaching method that focuses on the needs and abilities of individual learners. This approach emphasizes active learning, where students are actively engaged in their own learning process, rather than passively receiving information from a teacher. which can be especially beneficial when working with complex topics like microelectronics. This can involve activities such as problem-based learning, inquiry-based learning, and collaborative learning.

Some key principles of a learner-centred approach to education and training include:

1. Meeting the individual needs and abilities of learners.
2. Encouraging active learning and engagement.
3. Providing opportunities for learners to direct their own learning.
4. Fostering collaboration and teamwork.
5. Promoting critical thinking and problem-solving.

In a learner-centred VET setting, these principles can be applied in a number of ways, such as through the use of hands-on activities and real-world problem-solving, providing flexible learning opportunities that allow students to tailor their education to their individual goals, and incorporating industry feedback and input into the curriculum.

Overall, a learner-centred approach to VET can help students develop the skills and knowledge they need to succeed in their chosen careers, while also providing them with the flexibility and autonomy to direct their own learning.

In a learner-centred approach, the role of the teacher is to facilitate learning, provide guidance and support, and assess learners' progress and achievement, rather than simply delivering content or imparting knowledge. Learner-centred teaching methodologies should be based on principles of individualisation, personalisation, and engagement, and should be regularly evaluated and adapted to ensure their effectiveness and relevance.



2.2. Key principles of a learner-centred approach

1. Meeting the individual needs and abilities of learners

Meeting learners' individual needs and abilities is an important aspect of education. Every student has unique strengths, weaknesses, and learning styles, and it is the responsibility of educators to provide instruction and support that takes these differences into account. This can be done through a variety of methods, such as differentiating instruction, providing accommodations and modifications, and using a variety of teaching strategies to engage all learners. By addressing the individual needs and abilities of learners, teachers can help ensure that all students have an equal opportunity to succeed in their studies.

There are many ways that educators can approach meeting the individual needs and abilities of learners. Some common strategies include:

- **Differentiating instruction:** This involves tailoring instruction to the individual needs of each student, so that everyone has the opportunity to learn at their own pace and in a way that is most effective for them. This might involve providing different levels of support for students who need extra help or providing more challenging material for students who are ready for it.
- **Providing accommodations and modifications:** These are changes to the way that instruction is delivered or to the materials used, to help students with disabilities or other special needs succeed. Accommodations might include things like providing extra time on tests, while modifications might involve adapting the material to make it more accessible.
- **Using a variety of teaching strategies:** Different students respond to different teaching strategies, so it can be helpful to use a variety of approaches to engage all learners. This might include using hands-on activities, visual aids, and collaborative learning, among other things.



By taking these and other approaches, educators can help ensure that all students have the support they need to succeed, regardless of their individual needs and abilities.

2. Encouraging active learning and engagement

Active learning involves students taking an active role in their own learning, rather than passively receiving information from a teacher or textbook. This can help students retain information better and develop critical thinking and problem-solving skills.

To encourage active learning and engagement, teachers can use a variety of strategies, such as:

- Providing hands-on activities and experiments: These can help students learn by doing, rather than just listening to a teacher or reading from a textbook.
- Encouraging group work and collaboration: Working in groups can help students learn from one another and develop important skills like communication and teamwork.
- Using technology: Technology can be a powerful tool for engaging students and helping them learn in new and interesting ways. For example, teachers might use educational apps, online games, or virtual reality experiences to help students learn.
- Asking questions and promoting discussions: Asking open-ended questions and encouraging students to discuss what they're learning can help them think critically and develop their own opinions and ideas.

Encouraging active learning and engagement can help make learning more enjoyable and effective for students, and can help improve academic outcomes.



3. Providing opportunities for learners to direct their own learning

This involves giving students some control over what they learn and how they learn it, which can help them develop independence, critical thinking skills, and a sense of ownership over their education.

There are many ways that teachers can provide opportunities for learners to direct their own learning. Some common strategies include:

- Giving students choices: This might involve letting them choose their own topics to study, the projects they work on, or the materials they use.
- Encouraging self-directed learning: This involves giving students the freedom to explore their own interests and curiosities, and to take the lead in their own learning.
- Using inquiry-based learning: This approach involves having students ask their own questions and then figure out the answers for themselves, rather than being told what to learn by a teacher.
- Providing open-ended assignments: Instead of giving students a specific task to complete, teachers can provide open-ended assignments that allow students to come up with their own solutions and approaches.

Providing opportunities for learners to direct their own learning can help students become more independent, engaged, and motivated in their studies.

4. Fostering collaboration and teamwork.



Collaboration involves students working together to achieve a common goal, and can help them develop important skills like communication, problem-solving, and teamwork. Teamwork can also help students build relationships with their peers and create a positive learning environment.

To foster collaboration and teamwork, teachers can use a variety of strategies, such as:

- Providing opportunities for group work: This might involve having students work in small groups on projects, discussions, or other activities.
- Encouraging teamwork and cooperation: Teachers can encourage students to support one another and work together to achieve a common goal.
- Using cooperative learning strategies: These are specific techniques that teachers can use to help students work together effectively. For example, students might be organized into groups and given specific roles, or they might be asked to work together to solve a problem or complete a task.
- Providing support and guidance: Teachers can help students develop the skills they need to work together effectively, by providing feedback, modeling good collaboration, and offering support and guidance when needed.

Fostering collaboration and teamwork can help create a positive and supportive learning environment, and can help students develop important skills that will serve them well in their future studies and careers.

5. Promoting critical thinking and problem-solving.



Critical thinking involves evaluating information and arguments in a logical and reflective way, and problem-solving involves using critical thinking skills to identify and solve problems. These skills are important for students to develop, as they can help them become more independent and capable learners and can prepare them for success in their future studies and careers.

To promote critical thinking and problem-solving, teachers can use a variety of strategies, such as:

- Asking open-ended questions: Rather than asking questions with a single right answer, teachers can ask questions that require students to think critically and come up with their own answers.
- Encouraging reflection and metacognition: Teachers can encourage students to think about their own thinking, and to reflect on their learning processes and strategies.
- Providing opportunities for problem-solving: Teachers can give students real-world problems to solve, or can create scenarios that require students to apply their critical thinking skills.
- Modeling critical thinking and problem-solving: Teachers can demonstrate how to think critically and solve problems by working through examples and explaining their thought processes.

Promoting critical thinking and problem-solving can help students become more independent and capable learners, and can help them develop skills that will serve them well in their future studies and careers.

2.3. Learning centred approach in ECoVEM Courses

The courses developed within the ECoVEM project will be delivered using the following training scenarios:



2.3.1. On-line (stand-alone) training:

It refers to a type of training that is conducted entirely online, without the need for in-person interaction or classroom attendance.

Common components of this type of training are:

- Access to online resources: This includes access to tutorials, videos, online courses, eBooks, articles, and other educational materials that can help learners acquire knowledge and skills.
- Self-assessment tools: Many online training programs provide learners with self-assessment tools, such as quizzes or tests, to help them gauge their progress and identify areas where they need to improve.
- Feedback mechanisms: Feedback mechanisms such as forums, chat rooms, or other online communities allow learners to connect with other learners and receive feedback on their work.
- Self-motivation: In online training without a tutor, learners must take responsibility for their own learning and stay motivated to complete the program. This requires self-discipline, time management, and a strong desire to learn.
- Flexibility: Online training programs without a tutor often allow learners to learn at their own pace and on their own schedule, making it easier for them to fit learning into their busy lives.

Overall, online training without a tutor can be an effective way to acquire new knowledge and skills, but it requires self-motivation, discipline, and commitment to make it successful.

2.3.2. On-line (tutored) training.

Online tutored training is a form of online learning where learners receive guidance and instruction from a tutor or teacher who facilitates their learning experience. This type of training typically involves the following components:

- Live or recorded lectures: Online tutored training often includes live or recorded lectures where the tutor delivers content to the learners. These lectures can be synchronous, meaning they occur in real-time, or asynchronous, meaning they are recorded and can be viewed at any time.
- Interactive learning activities: Tutors often provide interactive learning activities such as group discussions, online quizzes, and assignments to help learners apply the knowledge they have acquired.



- One-on-one sessions: Tutors may provide one-on-one sessions with learners to answer questions, provide feedback on assignments, and offer personalized instruction.
- Feedback and evaluation: Tutors provide feedback and evaluation on assignments and assessments to help learners gauge their progress and identify areas where they need improvement.
- Collaboration tools: Online tutored training often provides collaboration tools such as online forums, chat rooms, and video conferencing to facilitate communication and collaboration among learners and tutors.

Overall, online tutored training provides learners with a more structured and guided learning experience compared to self-directed learning. It allows learners to interact with a tutor or teacher, receive feedback, and participate in collaborative learning activities, which can help improve their learning outcomes.

2.3.3. Visio training.

Vision training is a type of training designed to improve visual performance and enhance specific visual skills, such as depth perception, eye-hand coordination, and visual tracking. It can be used to treat vision problems or to enhance performance in sports or other activities that require strong visual skills.

Common components of vision training are:

- Visual exercises: Vision training typically involves a series of exercises that are designed to improve specific visual skills. These exercises can include tracking moving objects, focusing on stationary objects, and peripheral vision exercises.
- Eye-hand coordination: Eye-hand coordination exercises involve using hand-eye coordination to complete specific tasks, such as catching a ball or hitting a target.
- Specialized equipment: Some vision training programs use specialized equipment, such as virtual reality headsets, to provide a more immersive and engaging training experience.
- Personalized training: Vision training can be personalized to each individual's specific needs and goals, and a trained vision specialist can help design a program that addresses specific visual weaknesses or deficiencies.



Overall, vision training can help individuals improve their visual skills, enhance their overall visual performance, and improve their quality of life. It is often used to treat vision problems such as amblyopia, strabismus, and other eye movement disorders, and can also be used to improve athletic performance or other activities that require strong visual skills.

2.3.4. Work-based training

Work-based training is a form of training that takes place in a workplace or job setting, and focuses on developing specific skills or knowledge relevant to that particular job or industry. Work-based training can include a variety of activities designed to help individuals acquire the necessary skills and experience to be successful in their job.

Common components of work-based training are:

- **On-the-job training:** On-the-job training involves learning while performing actual job tasks, under the guidance and supervision of experienced colleagues or supervisors. This can include shadowing, mentoring, or apprenticeship programs.
- **Workshops and seminars:** Workshops and seminars can be organized in the workplace or at off-site locations to provide employees with additional training on specific topics or skills relevant to their job.
- **Self-directed learning:** Work-based training may also include self-directed learning, where employees are given access to online resources or other materials to help them acquire new knowledge or skills independently.
- **Performance evaluations:** Regular performance evaluations can help identify areas where employees need additional training or support, and can provide opportunities for constructive feedback and goal setting.
- **Cross-functional training:** Cross-functional training involves providing employees with opportunities to learn skills or gain experience in other areas of the organization. This can help employees develop a broader understanding of the business and enhance their skills and experience.

Overall, work-based training is designed to provide individuals with the skills, knowledge, and experience they need to succeed in their job or industry. It can help improve job performance, increase job satisfaction, and promote career development and advancement opportunities-



2.3.5. On-site training.

On-site training is a form of training that takes place at a physical location, typically the workplace or training center. It is designed to provide hands-on, in-person training to individuals or groups, and can be customized to meet specific training needs.

Some common components of on-site training are:

- Instructor-led training: On-site training typically involves an instructor or trainer who leads the training sessions and provides guidance and support to learners.
- Interactive learning activities: On-site training often includes interactive learning activities such as group discussions, role-playing, and hands-on practice exercises.
- Simulations and scenarios: Some on-site training programs use simulations and scenarios to provide learners with realistic training experiences that simulate real-world situations they may encounter on the job.
- Audiovisual aids: On-site training may also use audiovisual aids such as videos, presentations, and demonstrations to enhance the learning experience.
- Personalized training: On-site training can be customized to meet the specific needs of learners, and can be tailored to address specific knowledge or skill gaps.

Overall, on-site training provides learners with a structured and guided learning experience in a physical setting, and allows for real-time feedback and interaction with the instructor and other learners. It can be an effective way to provide training for groups of employees or to address specific training needs within an organization.

2.3.6. Hybrid on-site/on-line training.

Hybrid on-site/online training is a training approach that combines elements of both on-site and online training. It is designed to provide the benefits of both training methods while also addressing the limitations or challenges of each. Here are some common components of hybrid on-site/online training:

- Online learning modules: Hybrid training typically includes online learning modules that learners complete independently at their own pace, either before or after on-site training sessions.



- On-site training sessions: Hybrid training also includes on-site training sessions that provide hands-on, interactive learning experiences, and opportunities for learners to practice and apply the knowledge and skills they have learned online.
- Virtual classroom sessions: Some hybrid training programs include virtual classroom sessions that provide learners with opportunities to interact with instructors and peers in real-time, using video conferencing or other online collaboration tools.
- Self-directed learning: Hybrid training programs often incorporate self-directed learning activities, such as online discussions, quizzes, and assignments, to help learners reinforce their learning and stay engaged with the training material.
- Flexibility: Hybrid training provides learners with greater flexibility in terms of scheduling and location, as they can complete online learning modules at their own pace and participate in on-site or virtual sessions from anywhere with an internet connection.

Overall, hybrid on-site/online training combines the best of both training methods to provide learners with a comprehensive and flexible learning experience. It can be an effective way to provide training for geographically dispersed learners or to address the scheduling and logistical challenges of traditional on-site training programs.

3. Evaluation methods

During the development of the courses several evaluation methods should be implemented in order to assess the effectiveness and outcomes of the modules and courses.

The specific evaluation method chosen will depend on the goals of the program, the resources available, and the type of information needed to assess its effectiveness. For the ECoVEM project, each module should have its own evaluation as well as the whole course. The evaluation methods chosen are:

3.1 Assessment based on completion materials (videos, quizzes, etc.)

Assessment based on completion of materials refers to the evaluation of learning and competency achievement through the examination of completed assignments, projects, and other coursework



materials. This method of assessment is used in online learning, and vocational education and training programs.

The assessment based on completion of materials is designed to measure a student's ability to apply what they have learned to specific tasks. It is a form of summative assessment, which evaluates student learning at the end of a module. The assessment based on completion of materials can provide a comprehensive and meaningful picture of a student's learning and competency development, as well as provide valuable feedback to students and instructors.

3.2. Auto-assessment tasks.

This method refers to activities that students perform to assess their own learning and progress. They are a form of self-assessment in which students take responsibility for evaluating their own understanding and mastery of course material.

- **Fixed quizzes:** Short assessments that students complete on their own to gauge their understanding of course material.
- **Adaptive quizzes:** where the difficulty of the quiz questions is adjusted based on the student's performance. This method of assessment uses algorithms to determine the appropriate level of difficulty for each question based on the student's previous answers.

The objective of adaptive quizzes is to provide students with an accurate assessment of their understanding of course material, while also challenging them to demonstrate their mastery of the material.

- **Drag and drop activities:** These activities allow learners to interact with course material by dragging and dropping items into specific areas on a screen. This type of assessment provides immediate feedback to the learner and helps them understand the material better. The use of drag and drop activities can also be an engaging and fun way for learners to test their knowledge.
- **Video-quizzes:** These quizzes are integrated into videos, allowing learners to answer questions while they are watching the video. This type of assessment provides immediate



feedback to the learner and helps them understand the material better. Video quizzes can be an engaging and interactive way for learners to test their knowledge and retain information.

- **Virtual simulators:** It is an interactive, computer-based simulation that allows learners to experience a realistic representation of a real-world environment, task or process. The simulation provides immediate feedback to the learner and helps them understand the material better by providing hands-on experience. They can be an effective way to assess learning and help learners retain information by providing a more immersive and interactive learning experience.

Auto-assessment tasks are an effective way for students to take responsibility for their own learning and to identify areas where they need additional support or practice. They also provide students with an opportunity to reflect on their learning and develop their metacognitive skills.

3.3. Peer assessment tasks

Peer assessment is a method of evaluation where students evaluate the work of their classmates. It can be used as an educational tool to help students develop critical thinking and assessment skills, as well as to provide additional feedback on their own work. In peer assessment tasks, students are given the opportunity to review and evaluate the work of their peers, providing constructive feedback and scoring the work according to specific criteria. Peer assessment can be done in various forms, such as group presentations, written assignments, or online discussions. It can be an effective way to engage students, encourage collaboration, and provide a more diverse range of perspectives on the work being evaluated.

3.4. Self-assessment tasks.

With this method individuals assess their own work or performance. It is a way for individuals to reflect on their own learning and evaluate their own strengths and weaknesses. The goal of self-



assessment is to increase a learner's self-awareness and help them take responsibility for their own learning. It can also provide valuable information to educators about a learner's understanding and progress. Self-assessment can be an effective tool for promoting metacognition, or the process of thinking about one's own thinking, and for encouraging learners to set goals and track their own progress. Self-assessment tasks can take many forms, including:

- **Essay based on topics and providing a document as solution:** it is a common form of evaluation in education, where students are asked to write an essay on a given topic. This type of assessment is used to evaluate a student's understanding of a subject, their writing skills, and their ability to articulate and organize their thoughts. An essay-based assessment typically includes a prompt or question that the student must respond to in writing. The essay should be well-structured, with a clear introduction, body, and conclusion. The student should also use evidence and examples to support their arguments and use proper grammar, spelling, and punctuation.

Providing a document as a solution is a way to present the essay-based assessment. The document should include the essay in its final form, along with any additional materials, such as a bibliography or appendices. The document should be well-organized and easy to read, with clear headings and formatting. The student should also be sure to properly cite any sources they use in their essay.

Overall, essay-based assessments are a useful tool for evaluating a student's understanding of a subject and their ability to communicate their ideas effectively. By providing a document as a solution, students can present their work in a clear and professional manner, demonstrating their mastery of the topic and their skills as a writer.

- **Laboratory practices - laboratory work:** it is a method of evaluation commonly used in science, engineering. This type of evaluation is designed to assess a student's ability to perform laboratory experiments, collect and analyze data, and interpret results. Laboratory



practice allows students to apply the concepts they have learned in a hands-on, practical setting, and provides a real-world context for their understanding of the subject matter.

In a laboratory practice evaluation, students typically work in teams or individually to perform a set of experiments. They are expected to follow established procedures, collect data, and analyze the results. The laboratory practice may also include a written report or presentation, where students must explain their results and conclusions in a clear and concise manner.

This type of evaluation helps students better understand complex concepts, encourages critical thinking and problem-solving skills, and provides a real-world context for their learning.

- **Assessment based on software simulation activities:** This type of assessment uses computer-based simulations to evaluate a student's understanding of a subject or their ability to perform a specific task. Software simulations provide a virtual environment where students can practice and apply what they have learned, and receive immediate feedback on their performance.

In an assessment based on software simulation activities, students are given a set of tasks to complete using a simulation program. These tasks may include solving problems, making decisions, or performing specific actions. The simulation provides immediate feedback on the student's performance, allowing them to see the consequences of their actions and learn from their mistakes.

This type of evaluation is commonly used in engineering fields where students need to learn how to use complex systems or tools. Assessment based on software simulation activities can provide a safe and controlled environment for students to practice and develop their skills, and provides a more engaging and interactive learning experience. It is an effective



way to evaluate a student's understanding of a subject and their ability to apply their knowledge in a real-world setting.

4. Educational platform

Each VET developers from the ECoVEM consortium has to develop its own course platforms were ECoVEM curricula should be available and displayed.

These platforms will allow students to access course materials, take assessments, interact with instructors and classmates, and track their progress. There are many different types of educational platforms, each designed to meet different needs and goals.

Educational platforms should include:

- Course materials, such as videos, readings, and quizzes.
- Assessment tools, such as quizzes, exams, and assignments.
- Communication tools, such as discussion boards and messaging systems.
- Progress tracking and analytics, to help students and instructors monitor performance.

Educational platforms are an effective way to make education more accessible and convenient for students, as they allow them to learn at their own pace and on their own schedule. They can also provide a more engaging and interactive learning experience, as students can collaborate and communicate with each other online.

4.1. Data from the educational platform.

It is important for the ECoVEM project purpose to analyse some relevant figures regarding the educational platform. In order to obtain information of the type of learners and students that will be enroll in the courses, some data will be required:

- Personal data regarding the future learner (name, email, age, gender, country)
- Studies conducted (EQF level)
- Employment sector/status.
- How did the know about ECoVEM courses?



In addition, questionnaires ex ante will be required before beginning the courses to assess their previous knowledge and skills.

On the other hand, ex post questionnaires will be displayed after completing a course or module by learners. These questionnaires will measure their learning outcomes and degree of satisfaction.

To homogenise the information obtained and being able to compare results, these questionnaires will be standardized and agreed by the consortium as well as the format used.

Both ex ante and ex post evaluations can help to improve the educational experience by providing insights into student learning and helping educators to make informed decisions about course content and design.

The results provided by these questionnaires will be part of the deliverable 4.1 Plan for pilot test and field trial where a very specific manner the schedule, precise activities, tools (e.g. template of forms to collect feedbacks from users) to carry out the test and validation of the ECoVEM Curriculum and training will be designed.

The Plan will also detail the technics to collect feedback and inputs from users, as well as provide the tools (questionnaires, plans for interviews...).



5. Conclusions

According to the literature analyzed, learner-centred teaching methods can lead to increased motivation, engagement, and critical thinking skills in students. This approach involves active student participation in the learning process, providing students with choices and opportunities for self-direction, and allowing students to explore and construct their own understanding of the material.

The good results obtained using these training methodologies have rendered teacher-centred methodologies obsolete. As explained on this report, the benefits of using these methodologies are multiple, especially in engineering:

1. Increased motivation and engagement: When students can decide on what they learn and how they learn it, they are more likely to be invested in the process and motivated to learn.
2. Improved critical thinking skills: By allowing students to explore and construct their own understanding of the material, learner-centred approaches help to develop critical thinking skills.
3. Development of self-directed learning skills: Learner-centred approaches empower students to take responsibility for their own learning, which can help to develop self-directed learning skills that will serve them well in the future.
4. Better retention of information: When students are actively involved in the learning process, they are more likely to remember what they have learned.
5. Personalization of learning: Learner-centred approaches allow for a more personalized learning experience, as students can explore and focus on topics that are of interest to them.
6. Preparation for real-world problem-solving: By giving students opportunities to engage in problem-solving and decision-making, learner-centred approaches prepare students for the type of thinking they will need to do in the real world.

On the other hand, the evaluation methodologies selected for the courses and modules are those that best fit the knowledge and skills to be assessed and are in line with the chosen training methodology.



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