



Innovative VET Scalable Micro-Credential Solutions that Engage, Explore, Explain, Elaborate and Evaluate

D3.1

Guidelines for assessment of work-based learning practices applying micro courses leading to MCs by applying CUs

The purpose and application of assessment in work-based practices.

- Initial- and Continuing Aquaculture VET Courses (18 pages)
- Continuing VET Courses for EN 1090 Inspectors (XX pages)

<https://www.stimuli2.no/project/five>

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Assessment & Work-Based Practices



Applying CUs to produce MCs

*A Harmonized
Framework for
delivery of VET and
Higher VET*



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D3.1

*Guideline for Harmonized Work-Based
Learning Practices in Initial- and Continuing VET*



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Framework for Harmonization of Development of Learning Materials in Initial- and Continuing VET

Vocational education and training (VET) should better emphasize practical skills that directly lead to employment, with programs prioritizing hands-on training tailored to specific careers. Continuing VET should be designed to quickly prepare individuals for the workforce, typically spanning from a few months to a couple of years, and focuses on providing specialized training that meets the demands of specific industries. VET is closely aligned with industry certifications and standards – both formal and informal – often shaped by the training provided. This ensures that students gain skills that are directly applicable and valuable at their workplace. The adoption of technology in vocational settings is largely driven by a strong emphasis on return on investment and measurable outcomes, including higher job placement rates and shorter time to competency.

Additionally, industry partnerships are essential, as institutions collaborate closely with businesses and trade associations to ensure curricula remain aligned with emerging trends. Last but not least, vocational programs cater to a diverse audience, ranging from young adults starting their careers to older individuals pursuing career changes. This diversity demands a flexible and adaptable learning approach, where personalized pathways driven solutions can play a new transformative role.

As in other areas of education, the use of work-based assessment practices in vocational training is still in its early stages, with hands-on skills necessitating practical, real-world applications. In Europe, data on adoption rates in this sector is limited and rarely reported, likely indicating the slow progress of integration into continuing VET educational settings.

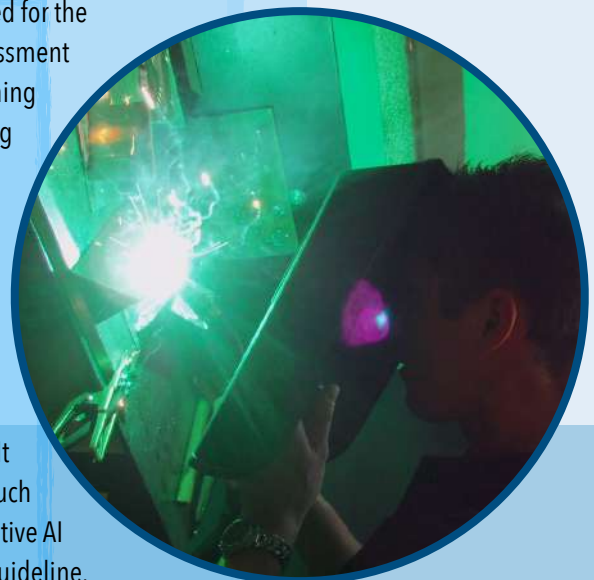


The Challenge with Assessment of Skills and Competence

Work-based assessment is often seen as a tool with the potential to enhance activities such as personalized learning and grading assessments, thus potentially improving efficiency in vocational training. A significant knowledge gap persists regarding how convenient assessment applications can directly support the practical, hands-on learning central to traditional initial- and continuing VET programs. For instance, while VET could better streamline the delivery of theoretical course components, integrating work-based skills and competence focused assessment driven solutions remains a challenge.

New work-based assessment services

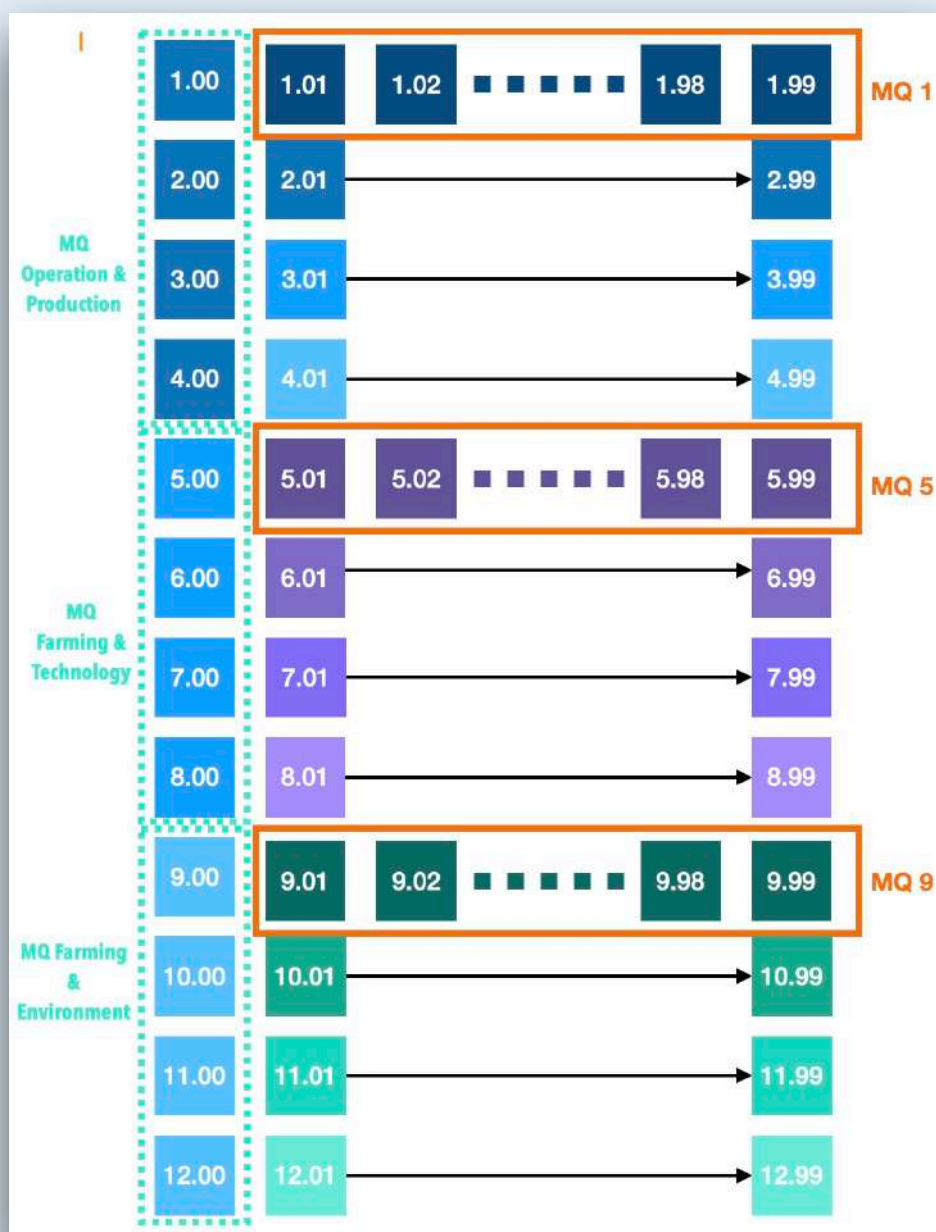
While tools for automated grading and exam integrity are suited for the theoretical components of VET, the true potential of work-based assessment lies in its application to interactive and immersive work-based learning experiences. Serves and tools used for tasks such as automated grading and exam integrity (e.g. ProctorU, Inspera, Wiseflow, Digiexam, Edtake and Gradie and many more) could be well-suited to vocational learning environments, especially in fields that combine theoretical knowledge with practical applications. It is expected that such tools could be especially valuable in initial- and continuing VET programs where theoretical knowledge forms the foundation for developing practical skills through work-based Initial VET leading to for instance national qualifications, and continuing VET driven by industry needs. It is, however, currently a very fast technical development of a range of such cost-efficient services and tools, partly driven by the rapid generative AI development, whereby details are not included into this short guideline.



An occupation is a broad category of work that includes multiple roles with similar skills and responsibilities.



Micro-Qualifications (MQs) Applied in Delivery of Initial VET and Continuing VET Micro-Courses in Aquaculture



The Initial VET program consist of 12 micro courses, that are organized into 3 Micro-Qualifications.

Each micro-course applies a harmonized structure containing Competence Units (CUs) with an assessment, leading to a Micro-Credential (MC).

Each micro-course in the Continuing VET programs, is extended to provide specialized Micro-Qualifications, each applying CUs and MCs.



Micro-Qualifications are composed of a number of harmonized building blocks leading to a MC.

A Micro-Qualification (MQ) contains a number of **Micro-Credentials (MCs)**. Each MC is delivered through micro-course(s) applying CUs containing an assessment.

A **micro-course** will typically be equivalent to a period of one or two days with studies. One day is equivalent to 8 hours. Work-based training practices for husbandry operatives, for instance in RAS or out at a cage, will come in addition. All together, one MC gives one 1 ECTS point, which should be equivalent to approximately 20-25 hours of studies.

Various occupations will require different ways of combining the micro-courses, as illustrated with the job profile descriptions below.

If a person, e.g. *Job Profile #4*, complete all the micro-courses and MCs associated to a specified MQ, this person will receive an **International Micro Specialization (IMiS)** diploma containing one MQ. This could for instance be **MQ 5 - Fish Welfare**, which could be delivered as for instance 5 separate micro-courses.

	MQ 5					
	5.01	5.02	5.03	5.04	5.05	
Job Profile #1	5.01	5.02	5.03	5.04	5.05	→ 4 MCs
Job Profile #2	5.01	5.02	5.03	5.04	5.05	→ 2 MCs
Job Profile #3	5.01	5.02	5.03	5.04	5.05	→ 3 MCs
Job Profile #4	5.01	5.02	5.03	5.04	5.05	→ IMiS

An **occupation** refers to a broad category of jobs that share similar tasks, skills, and responsibilities. It represents a general field of work rather than a specific job at a particular company. Occupations exist across industries and can vary in specialization depending on education, experience, and required qualifications.

A **job profile** is a more detailed and specific description of a particular role within an occupation, often linked to a specific employer category. It outlines the responsibilities, required skills, qualifications, salary range, and career progression opportunities for a given position. Job profiles help employers define expectations and guide employees in their professional development.

Job profiles contain a detailed description of a specific job role, including responsibilities, skills, qualifications, and career prospects.

Key differences between Occupations and Job Profile descriptions:

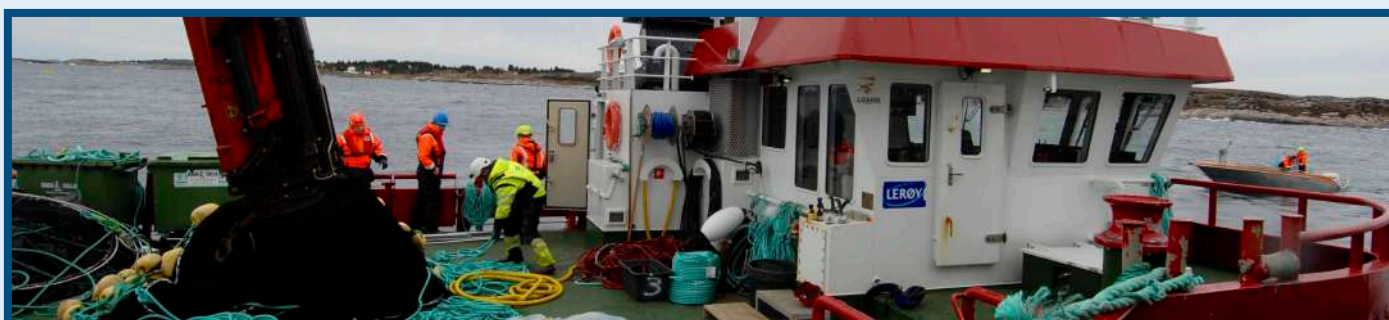
Example of an occupation profile

Features	Occupations	Job Profiles
Scope	Broad field of work	Specify a role within an occupation
The level of detailing	General skills and tasks	Detailing the responsibilities, skills and qualifications required
Application in industry	Applied across multiple disciplines and industries	Is linked to a particular company or a job posting
Examples	Husbandry operative, Site manager at a fish farm	Inspectors of underwater caches, veterinary assistants, specialist in RAS

A Husbandry Operative is responsible for the daily care, fish-welfare, and management of farmed fish species, ensuring their health, productivity, and overall fish well-being. This occupation is essential in aquaculture, fish farming and breeding industries. They play a crucial role in sustainable aquaculture and food production by ensuring the health and well-being of the farmed livestock. The job requires a combination of physical endurance, technical knowledge, and a passion for the animal care of the fishes. With experience and additional training, there are for instance opportunities for career advancement in farm management leading to a site manager position, veterinary support as assistant personnel, or animal nutrition.

Example of a job profile

A Husbandry Operative in Aquaculture is responsible for the care, feeding, health monitoring, and general maintenance of aquatic livestock, such as fish, shellfish, or other marine organisms, in a controlled environment. This role supports sustainable aquaculture practices by ensuring optimal water conditions, minimizing disease risks, and contributing to efficient fish farming operations.



Harmonized standards are specifications developed to ensure uniformity, safety, and compliance across VET providers, and between regions where those are located.



The Initial aquaculture VET program in Norway and Iceland are structured and organized into three main modules (leading to the 3 proposed MQs), each containing a number of Learning Outcomes (LO) descriptions:

- **Operations and Production** (17 LOs),
- **Farms and Technology** (9 LOs), and
- **Farming and Environment** (10 LOs).

These LOs are broadly defined to align with the harmonized curriculum's descriptions. Although all LOs are mandatory, the VET schools have the flexibility to prioritize certain LOs by dedicating additional time to them.

Initial VET - Harmonized Standards for the design of a Micro-Course

The micro-course 5.00, which is part of **MQ 2 - International Micro Specialization in Farming and Technology**, is applying harmonized building blocks containing the following key elements:



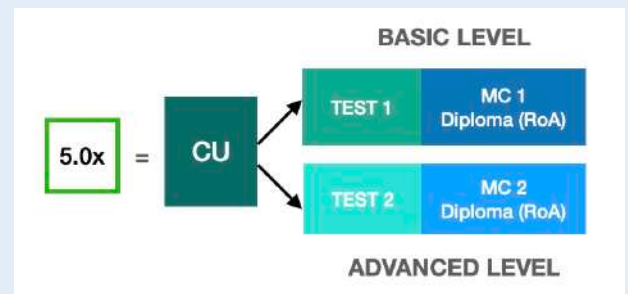
The harmonized description of the CU is provided in D2.2, containing the detailed description of the 4 stages that a teacher will follow in order to deliver the training. They are grouped into the stages STEP 1-4.

- The description of the TEST that is providing the assessment results, is part of D3.1.
- The description of the MC Diploma that is containing a description of the Record of Achievement. Several MCs may be combined into MQs. These are specified in D4.1.

Initial IVET refers to formal education and training programs designed for young learners or individuals entering the workforce. These programs provide foundational technical skills, industry-specific knowledge, and hands-on training to prepare individuals for a specific occupations or career paths.

Continuing VET - Harmonized Standards for the design of a Micro-Course

The micro-courses 5.0x, with x in the range from 1 to 99, are part of **MQ 5- International Micro Specialization in Fish Welfare**, is applying harmonized building blocks containing the following two key elements:



- The harmonized description of the CU is provided in D2.2, containing the detailed description of the 4 stages that a teacher will follow in order to deliver the training. They are grouped into the stages STEP 1-4.
- The description of the TEST that is providing the assessment results, is part of D3.1.
- The description of the MC Diploma that is containing a description of the Record of Achievement. Several MCs may be combined into MQs. These are specified in D4.1

Continuing VET (or CVET) refers to training programs designed for adult learners, workers, and professionals who want to upgrade their skills, re-skill for a new job, or adapt to changes in their industry. These courses help individuals remain competitive in the job market, meet industry demands, and comply with professional regulations.

The CU is the smallest harmonized educational unit available for a micro-course.

Micro-Courses: Pedagogy & Active Learning



Teachers at secondary and upper secondary school levels have long utilized various types of polling systems as standard pedagogical tools. These methods actively engage students in both individual and group learning, while serving as a formative assessment to gauge their understanding of subject matter. Simple yet effective techniques - such as raising hands, holding up colored cards, selecting from A, B, C, or D options, and multiple-choice questions - provide a cost-effective way to assess comprehension of knowledge, skills and competence in any learning environment. These tools are also commonly used in adult education settings, including vocational education and training (VET) and higher education, where discussion and debate play a key role in pedagogical approaches.

What stands out today is the widespread integration of technology across all areas of education and training. Whether utilizing traditional or modern tools, effective teaching remains grounded in well-established principles of instructional design and assessment. One key principle emphasizes the need for distinct pedagogical approaches tailored to support either passive or active learning. The choice between passive and active teaching methods depends on the learning context and subject matter. In some cases, a «passive approach» is appropriate, where the teacher, instructor, or lecturer presents new content in detail while students listen and observe. However, to reinforce learning or explore broader aspects of a topic, «active learning methods» including discussions, voting, debates, and peer learning, are often more effective in engaging students and deepening their understanding.

The term «andragogy» is often used to describe active learning and teaching methods specifically designed for adults. However, it is frequently debated that the digital teaching services used for both young learners and adults share many similarities, as they prioritize «active, collaborative, and cooperative learning» instructional processes over passive instruction. This overlap has led to a conceptual blurring between the terms «pedagogy» that typically is associated with education of youths, and «andragogy» that focuses on adult learning..



Bloom's taxonomy is widely used in education, training, and assessment design because it provides a structured, hierarchical framework for understanding and developing LOs.



Active and collaborative learning

It is often argued that the teaching methods used for both youngsters and adults share significant similarities, as they prioritize active and collaborative learning over passive instruction. This overlap has led to a blurred distinction between the terms «pedagogy (youth centered learning) and «andragogy» (focusing on adult learning).

Regardless of the terminology used to describe teaching models, all educators and trainers design instructional strategies to align with specific learning outcomes. This process typically involves the use of structured frameworks or hierarchies of learning levels, such as the widely recognized Bloom's Taxonomy, which categorizes cognitive learning into various levels of knowledge and understanding, as illustrated below.

Using LOs to plan questions

Globally, the learning outcomes models have become the standard approach for designing teaching sessions and assessments of those. Many countries, including those within the European Union, have established qualification frameworks that integrate learning outcomes into their education systems. These frameworks enhance transparency of learning levels, recognition of achievements, and open pathways for progression, while also serving as mechanisms for comparing qualifications across different regions.

Within this approach, LOs are typically categorized into three distinct domains knowledge (addressing theoretical understanding), applied skills, and competencies (focusing on work-based practical abilities). They sometimes includes the attitudes and behaviors (targeting soft skills and professional conduct).

This structured approach is commonly used when defining learning outcomes and designing assessments. One of the most widely recognized methods for organizing these domains is Bloom's Taxonomy. It offers a structured framework for categorizing various levels of learning and cognitive development in a progressive hierarchy.

Bloom's taxonomy is structured into three distinct domains, each representing increasing levels of complexity in learning. These domains include

1. The Cognitive Domain emphasizes cognitive processes, including knowledge acquisition, comprehension, problem-solving, information analysis, and logical reasoning. This domain is fundamental for fostering critical thinking and intellectual growth.
2. The Psychomotor Domain focuses on the development of practical skills, encompassing the acquisition of physical and technical abilities, proficiency demonstration, and the execution of tasks in alignment with established competency standards.
3. The Affective Domain encompasses professional behaviors, attitudes, and values, including ethical awareness, workplace conduct, and emotional intelligence in learning. This domain is essential for cultivating responsible, ethical, and socially aware professionals across various industries.

Each domain follows a progressive hierarchy of difficulty, which is reflected in different levels of curricula and assessment frameworks.

The Cognitive Domain

It consists of six progressively complex levels, as outlined in the diagram below (on the next page):

Peer learning is an educational approach where students learn from and with each other through collaboration, discussion, and shared problem-solving.



Peer Learning Experiences: How is comprehension enhanced through explanations and discussions?

- Remembering – Acquiring and recalling knowledge. The learner is expected to recall information, list key concepts, comprehend instructions, and accurately explain them back to the instructor.
- Understanding – Comprehending and interpreting information. The learner is expected to explain, summarize, and paraphrase newly acquired knowledge.
- Applying – Using knowledge in practical situations. The learner is expected to organize information, generalize insights from data, and present knowledge in various formats.
- Analyzing – Breaking down information to identify patterns and relationships. The learner should be able to classify knowledge and data, rank information based on criteria, infer insights, and draw conclusions from data sets.
- Evaluating – Making critical judgments based on knowledge and evidence. The learner should be able to apply analytical frameworks to assess data, make value-based judgments, and provide informed recommendations.
- Creating – Generating new ideas, concepts, or solutions by synthesizing information. At this level, the learner should be able to generate new knowledge, justify its value, invent innovative solutions, compose original ideas, and design creative concepts.



The Psychomotor Domain

It focuses on physical activities that require coordination between the brain and body. It involves various motor skills, ranging from basic movements to complex physical tasks. This domain is structured into progressive levels of difficulty, outlining what a learner should be able to perform, from simple to advanced actions, with examples as follows:

- Automatic application of skill: Design, produce, perform, create, initiate
- Skilled movements: Re-arrange, adapt, develop, change
- Precise activity: Assemble, calibrate, measure, mend, build, adjust
- Guided response: Imitate, copy, reproduce, react, repeat
- Context decisions: Adjust, locate, position, prepare, state, show
- Reflex movements: Ability to identify, select and relate



Peer Learning encourages deeper engagement with the subjects, and foster a supportive learning environment.



The Affective Domain

It focuses on behaviors, attitudes, opinions, beliefs, and values, playing a crucial role in all aspects of human learning. It is essential in curriculum design and helps shape the selection of LOs across different levels of education and training. It is not in focus in this guideline.

Examples of frequent verbs and words that may be applied in the description of LOs in the Cognitive Domain

- Remember: Describe, define, identify, list, name, recognize, reproduce, state
- Understand: Articulate, distinguish, estimate, explain, generalize, infer, interpret, paraphrase, rewrite, summarize, translate, give examples of, express, illustrate, present, select
- Apply: Apply, change, construct, demonstrate, modify, operate, predict, prepare, produce, show, solve, use, calculate, explain, illustrate, classify
- Analyze: Analyze, categorize, compare, contrast, differentiate, identify, illustrate, infer, outline, relate, select, separate, diagnose, experiment
- Evaluate: Appreciate, assess, compare, conclude, contrast, criticize, critique, describe, evaluate, explain, interpret, justify, summarize, support, determine, grade, rate
- Create: Plan, interpret, critically appraise, reorganise, generate, modify, solve, propose, formulate, suggest, recommend

Aligning Learning Outcomes with Teaching, Learning, and Assessment Processes

Once the LOs for a program or CU are established, the next step is to determine the most effective way to incorporate them into the syllabus content. After aligning the syllabus with these outcomes, the focus shifts to selecting the most suitable teaching methods for delivering the content.

At this stage, it is important to plan the learning activities that will engage learners as the content is being taught. These activities should be directly aligned with the expected learning outcomes and designed to anticipate how each outcome will be assessed.

The final step involves designing assessments that accurately and objectively measure each learner's achievement of the intended LOs standards for a micro-course.

The table below serves as a reminder to align the teaching and learning activities, including the assessment practices, for the expected type of work-based learning processes.

Well-structured questions guided by effective teaching and learning methodologies supports Peer Learning.

	LOs	Teaching and Learning Processes	Assessment Methods
Cognitive domain	Present knowledge, demonstrate understanding, apply and analyse, synthesis results, evaluate results.	Lectures, tutorials and demonstrators, work-based learning practices, individual, group and class work	Essays, quizzes, tests, exams, thesis, FAQs
Affective domain	Incorporation of targeted beliefs, attitudes, and behaviors.	Discussions, sessions and group work	Debates and discussions, work-based training practices

Experiences with Crafting Effective Peer Instruction Questions? Learning how to Assess Knowledge, Skills and Competences in VET.



Creating well-structured test questions is a crucial skill for teachers and trainers in any educational setting. Crafting effective questions for assignments, including micro-course assessment practices, and discussions require a high level of expertise, as well as a deep understanding of pedagogy. It is widely recognized that developing a carefully designed set of questions tailored to specific class sessions and subjects demands significant time, effort, and the subject matter knowledge. In many cases, it is beneficial for teaching teams to collaboratively design and agree on questions to ensure they effectively align with the required learning outcomes that are relevant for peer learning. This collaborative peer learning approach ensures consistency, fairness, and relevance. It has the potential to foster an engaging and dynamic transfer of the knowledge and skills acquired into the emerging new interactive and effective work-based VET assessment processes enhancing critical thinking.

Peer Instruction were invented by Prof. Eric Mazur

Micro Courses with an Interactive Question Based Learning Approach

1. The teacher presents an open question to the class, offering multiple possible answers.
2. Students get an individual thinking period and provide feedback individually with their preferred (open text) answer(s). The results are displayed for everyone to see.
3. Small group discussions take place, where students collaborate in pairs or small groups (2–4 students) to analyze, debate the possible correct answer and set up a prioritized list. They then vote again as a group in order to validate the prioritized list..
4. An in class discussion follows, led by the teacher, who reveals and validate the correct answers and explains it in detail, clarifying key concepts. It is of equal importance to reveals why the incorrect answers are incorrect.

This approach not only fosters active learning and engagement, but also enhances concept comprehension and peer collaboration, making it a highly effective VET classroom strategy.

Micro Course with heterogenous classes provide pedagogical challenges!

Classes in VET and Higher Education (HE) are now more diverse than in the past, with learners bringing varied levels of knowledge, skills and competences shaped by their prior experiences or work backgrounds. Many classes, including those in VET, includes a mix of young and adult learners, making it essential to design micro course teaching and assessment strategies that cater to all student needs.

Additionally, it is widely recognized that large lecture-style classes are often ineffective in capturing student attention, encouraging active participation, or fostering meaningful discussions with peers and instructors. As a result, more engaging and interactive teaching methods are necessary to enhance and support the learning outcomes and student engagement in micro courses.

Three main challenges includes

- Limited student engagement in a passive, top-down teaching approach, where the teacher delivers content with minimal or no interaction, resulting in reduced attention and active learning.
- Attendance is too poor.
- No clear method to assess overall student learning during a session or to gauge the progress of individual learners.



Micro Course question design and purpose, including difficulty of questions

The type and complexity of questions will be determined by the following factors:

1. The micro course content and subject matter
2. The intended learning outcomes
3. The micro course format and structure
4. The qualification level and standards
5. The specific learning objectives for a micro course session, e.g. class or blended learning

Testing knowledge, skills and competences

A number of questions must be designed to assess precise technical knowledge, skills and competences:

- Knowledge and skills checks: A series of short, broad subject matter questions posed rapidly to assess the class's general understanding of a specific micro course topic.



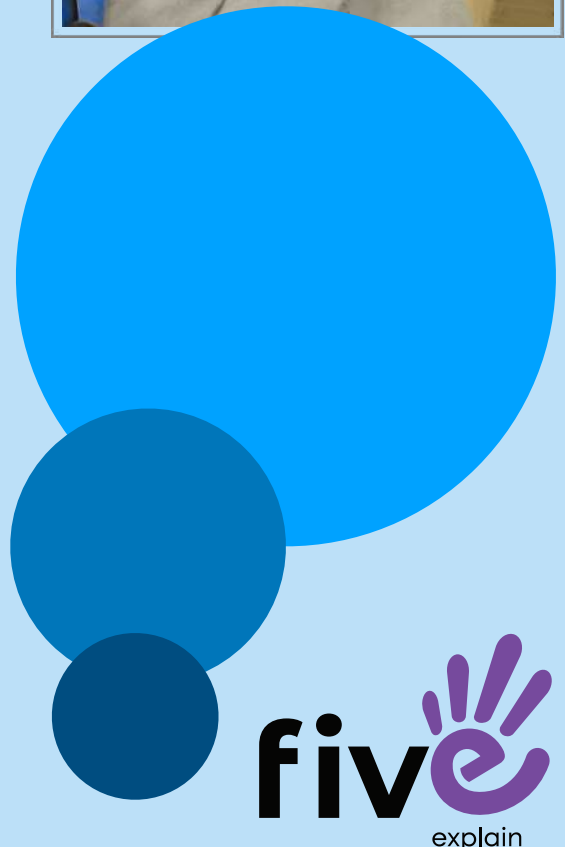
What skills or knowledge should the learner demonstrate?
How does the question relate to actual workplace scenarios?
Are you testing understanding, application, or problem-solving?

- Exploratory questions: Designed to encourage micro course discussions and promote a broader understanding of the subject.
- Problem solving questions: Used in small group discussions to stimulate deeper analysis and critical thinking on a topic.
- Assessment based questions: Structured to contribute toward a student's final MC or MQ grade.

The questions with options may be delivered in various formats, including text, audio, video, or integrated within learning artifacts such as multimedia. The key is to ensure that they are relevant, well-structured, and engaging to capture students' interest and enhance their learning experiences.

Poorly designed questions with options will create confusion among students and diminish their engagement with the learning process. To prevent this, careful preparation is essential when developing questions. It is considered best practice to test the questions and options by piloting them with a small group of students. Alternatively, educators can collaborate with colleagues, discussing and refining questions based on shared expertise and experience to ensure clarity and effectiveness.

The frequency with which an incorrect option is chosen serves as an indicator of its validity. If, after numerous attempts, a particular incorrect answer is never selected, it is likely ineffective and should be revised or replaced to maintain the integrity of the question. Analyzing the frequency of incorrect answers can help identify areas where students struggle, highlighting topics that may require additional instruction or improved teaching strategies. The larger the number of candidates who attempt a question, the more reliable the analysis becomes. A minimum of 100 responses is recommended to obtain a meaningful and accurate assessment of the question's effectiveness.



What are the Micro Course multiple choice questions?

Multiple choice questions, also known as objective tests, require learners to select or provide a response to a question with a pre-determined correct answer. These tests do not allow for subjective responses or personal opinions, as each option must be definitively right or wrong to ensure objective marking and assessment. Based on this definition, objective tests can extend beyond the traditional format of selecting one correct answer from a list of four or five options, offering a more varied and complex question structures:

- Multiple choice (select one)
- Multiple choice (multiple answers)
- True or False (the simplest of multiple choice!)
- Fill in the blanks in the text from the drop-down boxes
- Type in the answer (short answer)
- Drag and drop words into the text
- Drag and drop answers onto an image
- Drag and drop markers or targets
- Drag and drop to match images
- Drag and drop text/images to create a sequence
- Matching by connecting corresponding items from two lists.

Both videos and still images can be incorporated into questions, depending on the appropriate question format, to enhance engagement and assessment effectiveness.



How to create Micro Course multiple choice questions?

The planning process:

- Analyze the qualification's learning outcomes to determine what needs to be assessed.
- Identify the required assessment methods and pinpoint opportunities for objective testing.
- Select the most suitable type of objective test for each identified assessment opportunity.
- Prepare your questions, collaborating with subject matter experts and colleagues to refine and finalize each one. Avoid using tables in your formatting, as they can slow text transfer. Before you begin, agree on a clear, consistent format in your document that suits your needs. Implementing a disciplined titling system will make it easier to locate specific questions in the future.
- Create and source any artwork or images.
- If the questions are a summative assessment, ensure that they meet any internal or external approval requirements.
- Upload questions to software and system, including the results.
- Test - Use - Improve



Learning is often assessed through recall-based tests rather than application.

Creating the test

A valid test item enables candidates to demonstrate their knowledge, understanding, skills and competences necessary to meet the learning outcomes of a MC or MQ. To ensure its effectiveness, it must be well-constructed and grammatically accurate, and technically sound and aligned with assessment standards.

The question text should be clear, concise, and unambiguous. By avoiding using overly complex, tricky, or misleading phrasing, it will keep it straightforward and easy to understand. The focus should be on assessing the candidate's knowledge, skills and competences related to the subject, rather than their reading abilities.

The question should be concise, clear, and contain only relevant information. However, if needed, a brief introduction or scenario may be included before the main question to provide context. The candidate should be able to understand and answer the question independently, without relying on the answer choices for clarification. The options should serve as possible answers, not as a means to determine the question's intent.

True and False questions are a basic form of multiple-choice with only two possible answers: True or False. However, crafting these questions can be challenging, as it requires writing a clear and precise statement that allows for only one absolute correct response. The question should be written as a statement of fact, and not as a question. Words that can signal the correct response should be avoided. The same should lifting statements from course materials and lecture notes etc so that recall alone is not used to give the correct answer.

The options to the question text should include the correct answer (the Key) and the plausible incorrect answer (the Distractors). In a single-answer multiple-choice question, there must be only one correct answer (the Key) that is unquestionably accurate and not open to interpretation. The plausible incorrect answers (the Distractors) should be realistic and plausible, yet clearly incorrect. The most effective

distractors often come from common misconceptions or mistakes students have made in previous tests or discussions. Experienced teachers, familiar with typical student errors, are often the best sources for creating strong distractors.

- The answer options should be concise and shorter than the question text to minimize excessive reading and maintain clarity.
- The answer options should be consistent in length, style, and grammatical tense to prevent clues that might allow candidates to guess the correct answer.
- If the text is a question, each option should answer the question. If the text is a statement, each option completes the statement.
- Ensuring the correct answer is not longer or more detailed than the plausible incorrect alternatives to avoid giving unintended clues.
- Avoid using «None of the above» as an answer option. If selected as the correct answer, it does not demonstrate whether the candidate possesses the required knowledge, but only that they recognize the incorrect options.
- Avoid using vague qualifiers like «perhaps», «possibly», «sometimes», or «usually», as they create uncertainty and suggest that there is no definite answer. Objective tests should assess clear, factual knowledge and skills, not opinions. Additionally, the word «usually» often signals a true answer, making it an unintentional clue.
- Applying five answer options reduce the chance of passing by «chance».
- Avoid using technical terms that are not directly relevant to the knowledge, skills and competences being assessed, as they may confuse candidates and detract from the focus of the question.

Teachers may not know whether students understand the learning materials, if they don't support or provide immediate feedback solutions during the VET.

Layout of the quiz and of the question text

The layout of a question significantly impacts how easily candidates can read and understand it. Since the goal is to assess subject knowledge, skills and competences rather than reading ability, a clear and well-structured layout is essential for creating an effective question.

Displaying one question per screen minimizes distractions and improves focus compared to a scrolling test. It also reduces the risk of candidates overlooking or skipping questions.

Each question should be designed to fit entirely on the screen without requiring scrolling to view all answer options. This requires consideration of the devices and screen sizes that will be used. In most cases, designing for a laptop widescreen format is recommended, as it typically presents the greatest height limitation compared to width. This may be done by using tables, though not all software supports these features.

The ideal line length for on-screen text is 10 -14 words, as longer lines make it harder for the eye to track and process information efficiently. This reinforces the importance of keeping question text clear and concise for optimal readability.

When using an image in the question text, position it to the left or above the text for optimal readability. In Western cultures, the eye is naturally drawn to images first, then moves right and downward to locate text. Placing images to the right or below the text requires more effort for the reader to find the information.

However, for certain question types, such as target-based questions, positioning the question text above the image may be necessary. To improve readability, ensure the text is in bold so that it stands out clearly.



Layout of the options and the option text

Arrange the answer options in a logical order to enhance readability and reduce cognitive load. Use:

- Ascending or descending order for numbers, dates, or sequential values.
- Alphabetical order for single words of similar length.

This helps candidates quickly process the options and focus on selecting the correct answer.

When answer options vary in length, arrange them from longest to shortest or vice versa to improve readability. A mix of different line lengths creates visual clutter, making it harder for the eye to process shorter options efficiently. Keeping a structured order ensures clarity and ease of reading. The options should not be shuffled.



When to use objective tests?

Good objective tests take a lot of time to create, particularly in the writing of them. A realistic estimate for completing a fully developed test item is around 3-4 questions per day. However, this initial investment in time can be quickly offset when:

- The number of candidates is large, maximizing efficiency.
- Instant marking and feedback streamline the assessment process.
- Results are automatically stored in the LMS or exported for further analysis.
- The course is well-established,, allowing questions to be reused annually with minimal updates.

This structured approach ensures long-term efficiency and sustained benefits in assessment management.

The use of online objective tests significantly reduces the marking workload for the teachers, while enhancing the speed and efficiency of feedback for candidates. These tests can be effectively integrated at various points within a learning program, offering numerous opportunities to assess knowledge, track progress, and provide immediate feedback.

Keep in mind in this approach that objective tests also could be used before or at the start of a course to assess candidates' prior knowledge and to identify any possible misconceptions. The results can be used to develop an individual training needs analysis, allowing instructors to refine and tailor classroom teaching to better address specific learning gaps.

The tests could be part of formative assessments that occurs throughout a course, providing candidates with opportunities to practice, refine skills, and deepen their understanding in a supportive learning environment. A summative assessment, on the other hand, evaluates a candidate's achievement against the learning objectives of a qualification. It is typically conducted during or at the end of a course but can also take place beforehand to accredit prior learning (APL) and recognize existing knowledge or skills.

As discussed, creating objective tests requires a significant initial time investment. However, their long-term benefits—such as efficiency, scalability, and automated assessment must outweigh the effort required to develop them.

Objective tests do not provide candidates with opportunities to express personal opinions or demonstrate creativity, as they focus on selecting predetermined answers rather than open-ended responses. Assessing problem-solving skills can be challenging when candidates must choose from predefined solutions. A «blank-page response» often provides a more effective way to evaluate their critical thinking and independent problem-solving abilities. A candidate's understanding of a subject may not always be fully assessed through multiple-choice selection; however, when designed effectively and used in the right context, objective tests can still provide valuable insights into their knowledge and comprehension.



Expectations, performance standards and success indicators should be defined for the assessment criteria



Assessment of work-based training

Obviously, online objective testing has limitations in assessing practical skills and competences, as hands-on demonstration is often required for accurate evaluation of work-based training activities. Integrating objective testing with other assessment methods enhances the validity and reliability of the overall evaluation process, ensuring a more comprehensive measurement of candidate performance. Objective tests are suited for micro courses that are delivered by e-learning, or as a combination of e-learning with blended learning methods.

Evaluating practical skills and work-based competencies requires assessment methods that go beyond traditional objective tests, ensuring that learners can effectively demonstrate their abilities in real-world or simulated scenarios.

This includes, for instance, to apply methods containing:

- Direct observations and demonstrations where the candidate in real time is assessed by a senior, leader or supervisor. This requires the learners to show their skills and competences during action at the work-place.
- Practical exams with skills testing is organized to let learners carry out specific tasks under controlled conditions.
- Self and peer assessment is carried out by letting learners reflect on their work-based operations and performance.
- Project based assessment where the candidate is assigned to real world tasks that requires planning, execute and present the solution of the work-based practices.
- Portfolio based assessment where the learners compile evidences of their work-based training activities, including applying for instance reports, projects, videos, pictures etc. to document the results achieved.

The core objective of work-based learning is to facilitate knowledge acquisition, skills and competence development within a real-world work environment. This encompasses essential technological, technical, social, and economic skills and competences that are directly applicable to workplace demands. Assessing practical skills requires a mix of hands-on tasks, direct observation, and structured evaluation methods to accurately measure a candidate's competence, efficiency and readiness for professional work. It must stimulate learners to improve and refine their practical abilities. Baseline knowledge, skills and competences could be measured by measuring and comparing the results achieved before and after the training has been delivered.

The 2020 Osnabrück Declaration, which outlines priorities for European cooperation in VET from 2021 onwards, emphasizes the importance of work-based learning as a key strategy to foster resilience, excellence, and high-quality, inclusive, and flexible VET systems. The fourth principle explicitly highlights the importance of work-based learning:

«Vocational education and training programs at all levels comprise work-based learning components that are further expanded also in continuing vocational education and training; apprenticeship schemes are further developed, to enhance Youth Guarantee offers, and are complemented by appropriate support and measures to stabilize the offer of apprenticeships, and to address specific challenges of small companies; in order to create work-based learning opportunities in different sectors of the economy, incentive measures could be provided for employers in line with national context».

Good practices for e-learning materials development

Teachers should take into account the differences of e-learning materials to conventional learning materials. E-Learning materials should be structured somewhere in between a digital presentation and a document format, meaning:

- Materials should be restructured into a type of a "slide", making sure that each page doesn't consist of too much text and scrolling.
- Materials should include multimedia aspects such as images, graphs and videos, to keep the end user engaged throughout the course.

This ensures a user-centered design of a platform, how is the user going to see the materials?

- Ease of navigation through the system.
- Customization of user's platforms, such as language, widgets etc.
- Clear instructions on use for new users.
- Mobile accessibility.

Currently more and more students use such platforms through their mobile devices. This is required to be taken into account when developing the platform and even more so when developing the learning materials.



Another very important aspect for the development of e-learning materials is student engagement through self-evaluation questions, addressing the gamification aspect of the courses. These can be developed in multiple types, such as multi-choice questions, true or false statements, drop-down lists, drag-and-drop exercises etc. The only types of questions not suitable for self-evaluation on e-learning systems are essay or open-ended questions, where a computer cannot provide feedback to the student if the answer is right or wrong. Such questions are more suitable for examinations, because a teacher can provide individual feedback to the student, regarding their answer. Looking at the future, this suitability might change because of use of different AI models, which could offer teacher-like input to open-ended questions.

When developing self-evaluation questions for students it is best to develop multiple types of questions, not focusing entirely on one type, because diversity will increase student engagement. There are two main ways of delivering auto-evaluation questions, one option is to deliver questions in between text or pages of text and another option to deliver questions in a package format and grade them as a quiz or micro-exam. Auto evaluation questions can be a requisite for the completion of the course or just a study tool for the student.

Another student engagement technique is leader boards. This would encourage competences between students and can be achieved by sharing specific user data between students. Such data for example is time spent studying is visible for all users, quiz results of their users are visible, and number of quizzes attempts also.

Functionality required from e-learning systems



All e-learning systems should enable core functions for the upload of different types of content:

- Course management
- Text
- Pictures
- Videos
- Questions
- User management
- Security
- Course scheduling

These types make the base of the study materials and should be included in any type of e-learning system.

E-learning systems should also offer condition-based progression systems, where students can proceed to another activity only if they completed a previous activity for example.

Learning management system (LMS) should provide the scalability. For instance, if we have new courses or need edits to the courses this should be provided with relative ease of use.

LMS features

When providing a course of e-learning or blended-learning the systems can be specialized for a type of course or a type of course delivery system. Such systems can include every part of the students training and try to remove any cross-platform interaction (such as LMS + email or telephone, zoom, etc). This means that the student only needs to learn how to use the total LMS platform to start studying and is offered all of the required information through the platform.



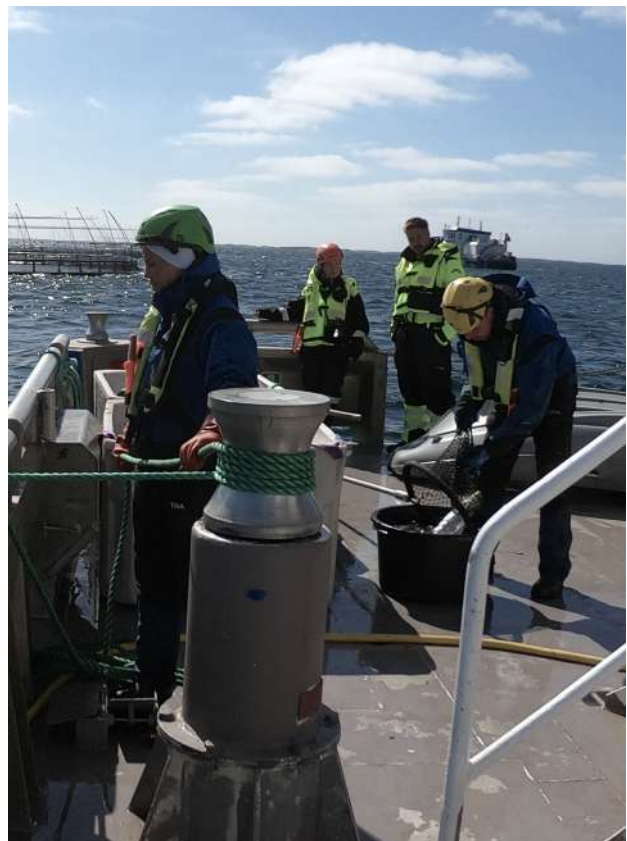
This would not take into account only all of the core functionalities of an LMS, but also include features such as:

- Student-student communication
- Student-teacher communication
- Calendarized course schedule
- E-classrooms directly integrated through the LMS
- Submission of course deliverables such as seminar works and homework's
- Examination process for final examination
- Data-driven insights such as Time spent estimations for the teacher to evaluate student engagement, quiz reports etc.
- Feedback mechanisms directly implemented to the platform (self-evaluation of knowledge progression)
- User support
- Customization of learning paths for each individual student

LMS offers excellent functionality for implementation Micro-Credential based VET programs. It enables fast and easy structuring of Competence Units, very efficient and user-friendly control over the whole study process comprises learning material contents, spend learning time and evaluation of learning outcomes. It enables implementation of several methods for knowledge verification such as combinations of multi-choice questions, descriptive questions (tasks) and/or oral exams. Teaching material, exams and course length can be easily internationally harmonized and assessed by independent external experts.

Example of LMS development done by IZV

IZV has historically offered education for personnel dealing with welding and other related technologies to materials joining. It still offers educational programs for NDT-personnel, welders, welding engineers (IWE) and welding technologists (IWT). Regarding completed IWE and IWT trainings IZV has the highest per capita enrollment of any institution in the international institute of Welding (IIW), educating over 150 welding engineers yearly.



Why is IZV ahead of its peers?

The programs IWE and IWT are part of the IIW/EFW educational scheme, thus highly regulated and externally audited every few years. Being actively involved in the development of the guidelines for these trainings, IZV is able to stay at the forefront and was able to implement blended learning schemes at their inception about 15 years ago. Our blended learning developed system enables combination of e-learning, on-line live lecturing and also on-site practical trainings. These work-base program includes combination of teaching methods such are interactive e-learning and self-study, following by live interaction with experts which offers presentation of use-oriented theory and practical trainings where technologies, good practice and experimental work is taken into consideration.

LMS-Moodle is used, which is a quite complex system that offers a lot of flexibility to the teacher and the developer, this also being its downside. Teachers are regularly educated on the new and emerging functions of the system and help in the systems development. If they require any other functions from the system, it can also be re-developed or tweaked. This offers high collaboration between teachers and LMS developers striving towards developing a Total LMS system that fits both the teachers and the students.



External Audits

IZV personnel also audit external LMS systems for other organizations doing the same training. This gives an insight into good practices done elsewhere in Europe and worldwide. All organizations offering such training should adhere to the blended learning guidelines prescribed by IIW. This is a good starting point for development, because it prescribes student-teacher communications, lectures, self-evaluation questions, attendance records etc. In return IZV is also audited by external organizations and receives invaluable feedback on how to further improve its training.

Student assessments are part of the training with the LMS portal being a crucial part of this assessment. Any irregularities in the online lectures or systematic problems with the portal are fixed ASAP, with students actively pointing out any occurring problems.

All the courses go through monthly status assessments, where student surveys are assessed and the whole system is internally audited. This enables the system to stay student oriented, while it keeps dynamically evolving by adjusting the LMS. The lectures, the teachers and the learning materials, whilst still adhering to the IIW framework, prescribed in the corresponding guidelines.



Why Blended-learning should be used?

Even though Slovenia is a small country, the implementation of blended learning trainings has enabled the students to spend less time on the road, complete the training from the comfort of their own home, enabled greening of the training and enabled shorter on-site training.

Having developed this for the local market in Slovenian language, IZV was also able to quickly adapt the program to English and thus offering the training to external markets. IZV actively works in Italy, Estonia, Lithuania, Serbia, Croatia, Bosnia while also offering trainings in English language to students from countries outside of Europe, such as Qatar, UAE, Mongolia, etc. The students can shorten their training by completing distance learning lectures and LMS self-study, while coming to Slovenia only to complete the Practical lessons and Examinations.

