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1.0 Introduction

The purpose of this report is to define the guidelines for VET providers to facilitate the integration of developed Creative Engine learning units in training curriculum for Engineering. The guidelines provide instructions on how to a) implement training making use of the Creative Engine learning units, b) attribute the most appropriate reference levels to learning units according to the partnership countries' National Qualification Frameworks (NQFs), and c) develop additional units fitted to their current training programmes. Finally, the report presents a practical example on how an existing VET programme could be modified to include the Creative Engine learning outcomes and units.

2.0 Learning units integration methodology

Separating the integration methodology into four phases, VET providers need to go through a sequence of processes in each phase in order to ensure that their organization will get the best results from the use of the Creative Engine learning units.

2.1 Phase 1: Prepare

- Identify an individual or team that will be responsible for undertaking the integration process. Working in collaboration with peers/experts will ensure the adoption of the widest possible perspective, and will avoid the risk of adopting only a trainer's viewpoint.
- Understand the factors that encourage change in the existing curriculum. Study Creative Engine outputs, elaborating on the necessity of improving innovation and creativity skills of engineering graduates, findings that are based on research from across Europe, in order to get a better overview of the situation in the industry. All outputs of the project are available online, on the official Creative Engine website at <https://creative-engine.org/>. The contact details of Creative Engine partners are also available there, and can



be used for establishing contact and discussing/clarifying terms and opportunities for using and promoting Creative Engine results.

- Select the curriculum that is most suitable for integrating one or more Creative Engine learning units. Go through existing curriculum offered by the organization (VET provider) targeting engineering disciplines, taking into consideration
 - a) the skills gaps identified by the Creative Engine partnership (available on the Creative Engine website to download);
 - b) the relevance of content and objectives between existing and Creative Engine learning units; and
 - c) Demand for existing curricula, selecting the curriculum that could best integrate Creative Engine learning units and offer added value to the organization and the market.
- Get feedback from industry stakeholders. Contact local engineering employers, present Creative Engine learning outcomes and consult on which of them would improve local innovation and creativity skills.
- Define the revised learning objectives of the curriculum, based on the integrated Creative Engine learning units. Following feedback from local industry stakeholders, the change-team consults on how Creative Engine and existing learning units could be combined, and decides on the main learning objectives of the new curriculum, which will be the axes for the design phase.

2.2 Phase 2: Design

- Define the main constraints for the design of the course. Consult with the VET provider's management/programme director and identify constraints related to:
 - a) Time available in the programme of the organization (e.g. will the curriculum be extended or will one or more existing learning units be replaced?);



- b) Upskilling of staff to design, implement and run the new curriculum (e.g. teaching staff may have to undergo the “Teacher Training Programme” to enable the effective delivery of CE learning units).
 - c) time available until the release of the new curriculum;
 - d) availability of teaching equipment (rapid prototyping) for hands-on lessons (e.g. is there a need to acquire related equipment?); and
 - e) Any other conditions that should be taken into consideration.
- Decide on potential existing learning units to be replaced by Creative Engine ones. If, based on constraints above, the course duration cannot be extended and one or more learning units from the existing curriculum have to be replaced by new ones, break down the existing curriculum into its learning units and, after examining potential overlaps among them, decide on which of the existing learning units will be replaced.
 - Check prerequisites’ consistency of the selected Creative Engine learning unit(s) to be integrated. Examine whether knowledge and experience required for a student to attend the course are covered by the prerequisites of the existing curriculum. If so, Creative Engine learning units can be used independently with the existing learning units. If not, Creative Engine learning units should follow existing learning units that provide knowledge required. Ensure that the prerequisites of the Creative Engine learning units to be integrated are added to the overall prerequisites of the curriculum.
 - Define the sequence of learning units based on the prerequisites described above, as well as on a teaching flow that suits the objectives of the course.
 - Adapt ECVET credits of the Creative Engine learning units into the existing allocation system. As credit points are a numerical representation of the relative weight of units in relation to the qualification, the change-team consults on the weight of the new learning units compared to the existing ones and allocates credits accordingly.



- Calculate total duration of the curriculum, by aggregating contact, hands-on, self-study and assessment hours of new and existing learning units.
- Assign the National Qualification Level of the curriculum, based on the methodology described in section 3.
- Train (if needed) the teaching staff. Assuming that the teaching staff have adequate teaching experience/qualifications, it should be sufficient for the trainer to undertake the Creativity & Innovation Teacher Training Programme. This will cover the fundamental principles associated with creativity and innovation in addition to pedagogical approaches that VET trainers can implement to encourage learners to build their creativity and innovation practical skills. Additional assistance could be offered by Creative Engine project partners if requested and availability permits it.
- Integrate learning materials. In collaboration with the teaching staff, integrate the existing learning material with Creative Engine's Open Educational Resources in order to support the new learning unit(s). The choice of approach and format for the existing curriculum depends on the overall strategy and common practices of the VET provider. Adopting those parts of the course that are relevant to the learning units being integrated should be a choice for VET providers that are already experienced in using online tools for training. (No facilitator can be made available from the Creative Engine partners, unless otherwise agreed with them.)
- Integrate assessment material. Modify the existing assessment procedures, either by using the assessment material suggested by Creative Engine partnership, or by developing new assessment materials, or both, in order to create a unified methodology that assesses the learning outcomes overall.

2.3 Phase 3: Run Pilot & Evaluate

- Run a pilot course. A VET provider forms a group of students (at least 5) that meet the prerequisites. (Alternatively trainers can assume the role of students, and the teaching staff delivers a mini course with the new learning unit(s) combined with the learning and assessment material.



- Evaluate the pilot course. Evaluate the learning process, based on feedback from teaching staff and learners. The evaluation tools will include personal interviews and group discussions, focusing on the achievement of learning objectives and potential improvement.

2.4 Phase 4: Optimize & Run

- Optimize the curriculum. Based on the evaluation process, make any necessary amendments to the structure, content and materials of the curriculum in order to best meet learning objectives.
- Run the new curriculum. Proceed with any necessary promotional activities and run the course.

2.5 Development methodology of additional units

In case a VET provider needs to develop new, additional, units for engineering skills on innovation and creativity, all methodology followed by the Creative Engine partnership for the development of Creative Engine learning units is available through the deliverables of the Creative Engine project on the official project website (<https://creative-engine.org/>). The methodology comprises the following reports, which outline the steps followed by Creative Engine partners, and could similarly be applied in extending the work of Creative Engine to fit the needs of different / specialised target groups:

- Definition of research tools for data collection
- Data analysis and reporting on learning outcomes
- Grouping of learning outcomes into learning units
- Learning units' specifications

3.0 Referencing National Qualifications Levels to the EQF



3.1 What is referencing to the EQF

Referencing is the process that results in the establishment of a relationship between the levels of national qualifications - usually defined in terms of a national qualifications framework - and the levels of the EQF. Through this process, national authorities responsible for qualifications systems, in cooperation with stakeholders responsible for developing and using qualifications, define the correspondence between the national qualifications system and the eight levels of the EQF.

3.2 How referencing is applied in Creative Engine

Based on the European Qualification Framework descriptors and Creative Engine learning outcomes in terms of skills, compete learning units have been attributed with the highest level that a VET qualification can obtain, which is Level 5. More specifically, level 5 EQF descriptors for skills, competence and knowledge define the following:

- Knowledge: Learner should have a comprehensive, specialized, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge.
- Skills: Learner should have a comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems.
- Competence: Learner should be able to exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others.

Creative Engine partners researched and consulted on how level 5 of the EQF can be translated to each partnership country's NQF, so that VET providers in each country (Spain, Ireland, Belgium and the United Kingdom) can attribute the most appropriate level to the new curriculum.

3.3 Spanish Qualifications Framework Reference



Level 5 of EQF corresponds to Level 3 of the Spanish Qualification Framework, more precisely consisting of:

- Professional Training: Higher Technical Degree, Professional Training, in Tertiary: Level 3.

3.4 Irish Qualification Framework Reference

Level 5 of EQF corresponds to Level 6 of the Irish National Framework of Qualifications. More specifically:

- Advanced Certificate (NFQ Level 6) and component (minor), specific purpose (special purpose) and supplemental awards at the same level.
- Higher Certificate (NFQ Level 6) and minor, special purpose and supplemental awards at the same level.

3.5 Belgian/Flemish Qualification Framework Reference

The Flemish Qualification Framework (FQF), being more detailed than the EQF, contains at least the core level descriptors of the EQF at the same level. The FQF therefore relate their qualification levels to the levels set out in the EQF. Level 5 of the Flemish Qualification Framework corresponds to level 5 of the EQF and covers vocational, technical, artistic and general training.

3.6 British Qualification Framework Reference

Level 5 of EQF extends across both Level 5 and Level 4 of the British Qualification Framework (England & NI), more precisely consisting of:

- Level 5 Vocational Qualifications
- Higher National Diplomas
- Level 4 Vocational Qualifications
- Higher National Certificates