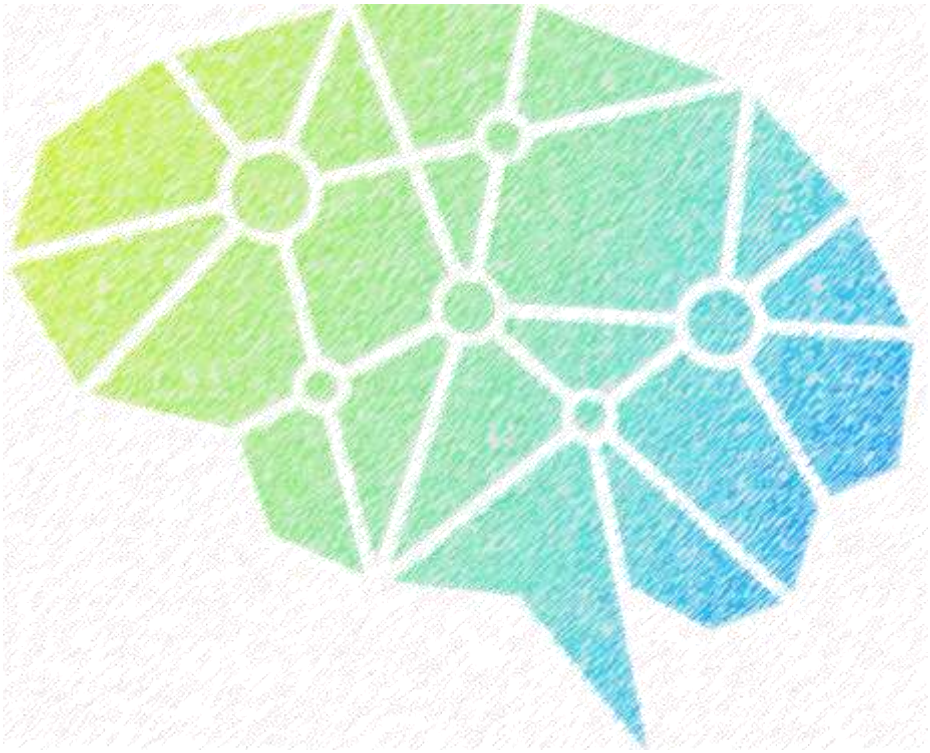
FIT FOR 4.0 – TRAINING TRAINERS AND TEACHERS FOR THE 4.0 PARADIGM

Project n. 2019-1-IT01-KA202-007766



Set of general questions for self-assessment on teachers' competences

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Content

Abbreviations

CEFR	Common European Framework of Reference for Languages
DG EAC	Directorate General for Education, Audiovisuals and Culture
DG EMPL	Directorate General for Employment, Social Affairs and Inclusion
DigComp	Digital Competence Framework for citizens
e-CF	e-Competence Framework
ECVET	European credit system for vocational education and training
EQAVET	European quality assurance in vocational education and training
EntreComp	Entrepreneurship Competence Framework
EQF	European Qualifications Framework
ESCO	European multilingual classification of Skills, Competences, Qualifications and Occupations
EU	European Union
GDPR	General Data Protection Regulation
HVET	Higher Vocational Education and Training
I4.0	Industry 4.0
ICT	Information and Communication Technology
IoT	Internet of Things
IPR	Intellectual Property Rights
IR4	Fourth Industrial Revolution
IT	Information Technology
KSA	Knowledge, skills, attitudes
MOOC	Massive Online Open Course
OER	Open Educational Resources
PBL	Project-based learning
VET	Vocational Education and Training

Foreword

"Fit for 4.0: training trainers and teachers for the 4.0 paradigm" is a project co-funded by the European Commission in the framework of the Erasmus+ Programme. Its goal is supporting teachers and trainers in the transition towards the new learning paradigm required by the digital transformation and the fourth industrial revolution.

Industry 4.0, digital revolution, smart factories, global interconnection – these are the keywords describing the present developments of the labour world. Vocational training can become "the first choice" to live this transformation, but at present only a few training centres in Europe can exploit necessary equipment and, even more important, teachers and trainers are not aware of the dimension of such changes, or can exploit the required tools (conceptual and methodological first, rather than technological). Some of them tend to focus on teaching rather than on learning; some are not fully aware of existing on-line tools for learning, teaching, assessing; some do not interact with each other as much as they could, thinking they have know-how to "defend"; some need a clearer picture of the nature, implications and real meaning of the 4.0 paradigm, which is not only "Industry" 4.0 and technology, but also involves the whole society.

In order to make VET sustainable, it is relevant updating its times and tools, favouring collaboration among teachers/trainers, learners, training providers, companies, social parts, local authorities.

Fit for 4.0 intends to take this challenge, by describing a set of competences useful to Vocational Education and Training (VET) teachers, and by developing and testing a set of training modules fit for "4.0", in strict co-operation with companies.

Fit for 4.0 is performed by a strong consortium of 10 partners in 8 EU Member States: Italy, Austria, Belgium, Denmark, Finland, Portugal, Sweden, the United Kingdom, representing a competent and skilled mix of excellent European VET players, in the spirit of providing for a true "strategic partnership".

This document describes the second project output, presenting a set of questions for self-assessment about teachers' and trainers' readiness to 4.0. In the streamline of distinctive competences identified for "4.0 ready" teachers and trainers (see "Set of competences targeted by the train-the-trainer programme", available on project website at www.fitfor4-0.eu), a set of 24 general questions have been drafted, covering the didactic, strategic and personal competence domains of trainers.

The questionnaire is freely accessible on line at the project web site. Being a self-assessment tool, its goal is to support teachers and trainers and invite them to reflect on their skills, attitudes and training habits, with a view to improvement. Completing the test does not bring to any score. In other words, there are no correct or wrong answers, but simply choices mirroring one's working method and preferences, and a chance to re-think them, if necessary.

1. The project Fit for 4.0

Rationale

The project follows a three-step development pathway.

Step 1, based on existing studies and direct experiences collected from teachers in the partner Countries about changes brought by Industry 4.0, aims at:

- describing and highlighting competences necessary to trainers, with special reference to the mechanic/mechatronic/automotive sectors, having in mind ICT skills as the engine for the "4.0 world". The focus is mostly on cross/soft skills, in addition to the professional ones that teachers already possess or can more easily develop.
- Delivering an on-line tool, allowing trainers to self-assess their readiness to handle and embed 4.0 topics in their daily work.

Step 2 designs and tests a train-the-trainers programme, structured in Training Units based on learning outcomes, with a pervasive and "intelligent" usage of IT tools. The programme will be developed in co-operation with local industry associated partners, especially as to learning objectives, and will include for example:

- the 4.0 paradigm: the scenario underlying the value creation chain for goods and services, in a globally interconnected environment;
- key enabling technologies for 4.0: chances, implications, didactics;
- how to design "4.0 learning experiences": planning, instructional design;
- 4.0 as a multi-disciplinary topic: how to embed 4.0 in all subjects, how to make trainers co-operate;
- co-design with companies: how to improve co-operation among teachers, trainers, enterprises;
- joint learning assessment by trainers and companies, including assessment of informal and non-formal learning;
- how to keep oneself up-to-date with the evolution of 4.0.

All topics will convey into a Massive Online Open Course (MOOC), including exercises, video clips, quizzes and research material.

Step 3 aims at ensuring mainstreaming and impact of results in partner territories. Trainers in the sample group will exploit outcomes in their day-by-day activities, by reviewing/setting part of/full programmes based on lessons learnt. Trainers and trainees in partner territories will participate in a friendly contest, competing to deliver best practices. Effectiveness will be assessed together with associated partners and results collected in guidelines, including also histories describing cases emerging from the contest.

Objectives

Project objectives are:

- describing a "minimum" of skills, namely didactical and transversal, needed by teachers/trainers, especially those involved in Higher Vocational Education and training (HVET), with regard to the 4.0 transition;
- developing a competence self-assessment tool, allowing VET teachers/trainers to measure their readiness for the 4.0 world and digital transformation;
- developing and testing, in strong cooperation with enterprises, a resource pack for trainers, a training programme delivered as a MOOC (Massive Online Open Course), complete with examples of training material, methods for learning assessment, innovative tools for training and learning;
- exploiting that MOOC to train a sample group of trainers, who will pilot their learning by co-designing training modules/programs in this new 4.0 concept, together with businesses;
- making such products available to everyone, even beyond the partnership, through a knowledge base of Open Educational Resources (OER) freely accessible via the same on-line platform used by the sample group;
- identifying a set of policy recommendations/suggestions to local, national and European decision-makers, for future updating of teachers' and trainers' competences.

To ensure concreteness, the project focusses on the mechanic, mechatronic and automotive sectors, where advanced digital competences are necessary, the digital revolution is already started, and meaningful company experience is in place.

The train-the-trainer programme aims mostly at improving skills for teaching, using innovative methods and tools, embedding the 4.0 paradigm in day-by-day work. That is why it relates to topics like understanding the sense and the impact of the 4.0 paradigm on study and work, or how to develop and run interdisciplinary 4.0 learning experiences together with colleagues and companies, how to make use of training methods mirroring operational processes at the workplace, how to assess competences in the digital era, and so on.

This train-the-trainer programme is practical and at the same time "intrinsically digital", built up with the same instruments it offers, that is, by transnational teams composed by trainers and company experts, making use of on-line cooperative platforms.

Trainers taking the programme will learn by visiting companies, by discussing with peers (even at distance), by exploiting Design Thinking and Instructional Design techniques, by exchanging views with experts and professionals, and by "seriously" playing.

Main expected results are:

- more skilled VET teachers and trainers;
- improved quality of learning, hence better employability of students and attractiveness of VET;

- increased and stable cooperation between training providers, teachers/trainers and enterprises;
- availability of sustainable tools, transferable to other economic sectors and other European countries.

Figure 1 synthesizes the project concept and model.

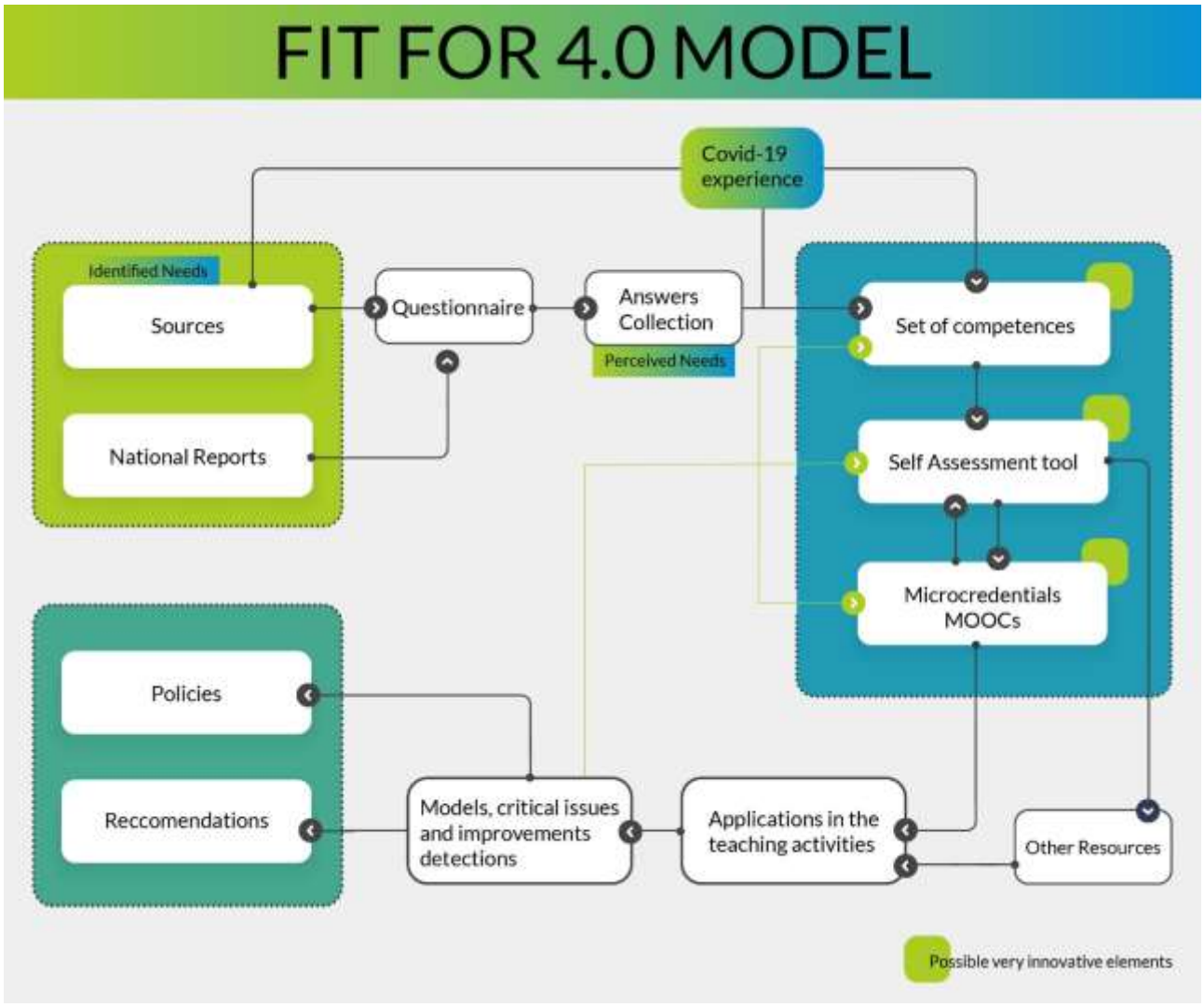


Figure 1 – The Fit for 4.0 model

2. The self-assessment tool

2.1. Methodology

Aims and scope

For teachers of technical subjects, Industry 4.0 is strictly linked to technology. Other teachers usually show a rather general/generic knowledge. Nevertheless, 4.0 is quite crosscutting among disciplines taught, either in initial VET courses, in technical HE or in post-graduation VET programmes. Nor implementing 4.0 requires mastering just technology subjects: data analysis, for instance, mathematical knowledge, like data reporting cannot leave out basic literacy and communication skills, both synthetic and analytic. More, being trainers in a 4.0 environment implies abilities like:

- using tools (and not only equipment) for online collaboration in the different development phases of a training path/project, e.g. instructional design techniques;
- exploiting inductive rather than deductive learning methods;
- structuring a training programme or module that fully delegates responsibility of part of expected learning to companies;
- assessing learning that occurred in contexts different from school;
- and so on…

This tool is meant to let VET teachers assess their own competence level about the 4.0 "world", i.e. to measure somehow their readiness to co-operate in a 4.0 training and learning environment.
It consists of an on-line tool for self-assessment, which gives teachers and trainers the chance to reflect on:

- background knowledge;
- knowledge of technology aspects;
- understanding of implications on organization/impact on work environment;
- knowledge/mastership of tools for designing, managing, assessing learning in a 4.0 perspective;
- inclination to change;
- ability to interact in a multi-actor environment.

The tool is based on a set of 9 non-technological competences, listed in figure 2.
Teachers and trainers interact and work in an underpinning technological/digital context, with a ***didactic*** aim, experiencing lifelong learning and own ***personal*** development, with an overall view to ***strategic*** continuous improvement: that is why, we assigned their competences to one of these three domains. Domains are level-independent (or cross-level), as they define fields of expertise, rather than measuring at what extent a competence is mastered. Boundaries of domains overlap and require adaptation in different contexts: in case a competence can refer to more of them, we allocated it to the best-fitting one.
For each competence, the tools asks a number of questions, following the methodology described at the next paragraph.

The goal of this tool is not "assessing" competences and giving teachers a grade.
Rather, it is a chance to (re)think of one's mind-set, attitudes, daily practices and behaviours, confronting them with the challenges and opportunities set by Industry 4.0: advanced team-working, acting in a multi-stakeholder environment, coupling face-to-face and distance interaction, making use of digital tools for communicating/teaching/ learning, getting acquainted with fast changes, the need for sharing own expertise and knowledge and for adopting others' strategies and tools, etc..

Technological/digital underpinning context

		title
domain	*Didactic*	D.1. – Design learning experiences with a 4.0 approach
		D.2. – Implement learning experiences with a 4.0 approach
		D.3. – Assess learning experiences with a 4.0 approach
		D.4. – Interact in learning environments 4.0-oriented
	Personal	P.1. – Keep oneself up-to-date
		P.2. – Information and knowledge management
	Strategic	S.1. – Process improvement
		S.2. – Innovating

Figure 2 – The eight competences investigated

Hence, **self-assessment** is the keyword. Respondents are not "taking a test". Instead, they are looking at themselves into a mirror, and are given the chance to stop and reflect.
There is no right or wrong answer, no prize or blaming: just an opportunity to review one's habits and consider if they can improve for the trainees' benefit. We could say that the aim of the test is not assessing skills against a given performance/knowledge level, rather to assess them against one's perception. In other words, the test is *diagnosis-oriented* rather than *control-oriented*.

In the framework of the project, this tool comes with a twofold scope:

a. to be used as a preliminary test by teachers/trainers taking the MOOC
b. to provide final feedback downstream the MOOC completion

Questions will be the same in both cases. Comparing one's answers before and after the training is meant as a further tool, to reflect on personal development.

About the questions

The test is expected to be attractive to teachers and trainers, that is, to encourage them exploring the MOOC. To that aim, partners decided to keep it easy-going, not too heavy and not too long. At the same time, to be helpful, the test could not be too simple and short.
Thus, it consists all in all of 24 questions, three for each competence shown in figure 2.
It requires about 15-20 minutes to be completed.

Questions are multiple answer, single choice. They usually address respondents in first person, encouraging to making reference to personal experience in answering. Frequently, they either ask respondents to complete a sentence choosing the most suitable conclusion among the proposed ones, or, they make a statement, asking respondents to express (the extent of) their agreement or disagreement. Each question offers 4/5 optional answers, and each option is worded to make all option equally "fair", to avoid the pitfall of implicitly suggesting that one choice could be "the right one" or "the best".
In some cases, options follow a kind of hierarchy, for example from minimum to maximum personal engagement in a situation or a context, but no judgement or preference is made among different options.
More, many questions tend to make respondents place themselves at a certain point between different ends, like:

- is my behaviour guided by my decisions or by external factors?
- do I prefer working alone or in team?
- am I more conservative or innovator?
- am I more likely to receive or to share?
- can I manage on my own, or do I need external help, or training?

Again, in several cases the offered options range from "being able to perform" to "being able to support others in performing", with a view to making respondents reflect on their roles and attitudes as teachers.

About the feedback

In line with the strategy of self-assessment, users do not get a numeric score, or a grade. There is no pass or fail. Or, rather, it is up to respondents to decide on their own if they feel satisfied with their answers.

Nevertheless, some feedback is there. It is a general one, at this stage (see Chapter 3. For future developments), mostly re-presenting respondents with their answers, to acknowledge them, and providing recommendations on the parts of the MOOC that might be of help for further learning and improvement on the different competences.

About the delivery

The test is and will always be accessible for free to everybody.
At present, users can take it in English via the project web site at www.fitfor4-0.eu. The delivery platform at the moment is a simple on-line questionnaire. As described at Chapter 3, once the platform for the MOOC will be released, the test will be moved, integrated on it, and made available in all partner languages: Italian, Danish, Dutch, Finnish, German, Portuguese, Swedish.

2.2. The set of questions

Competence D.1

Design learning experiences with a 4.0 approach

n.	*Text*	*Possible answers*
D1.1	I know what Industry 4.0 is, its enabling technologies and its non-technological implications on labour	❑ No ❑ No, and I would like to know more about this ❑ Yes, from a general point of view ❑ Yes, with special reference to some parts of it ❑ Yes, and I would be able to explain it to others
D1.2	I adopt a multi-stakeholder approach in designing my courses and preparing my lessons, starting from student needs and involving colleagues, labour market representatives, etc.	❑ No ❑ I prefer to rely on my previous experience ❑ Yes, when drafting the general picture ❑ Yes, regularly
D1.3	When I design the delivery of a course/ a lesson for the first time, I consider:	❑ Topics first, then methods & tools, time, indicators, assessment ❑ Methods & tools first, then topics, learning outcomes, time, indicators, assessment ❑ Learning outcomes first, then indicators, topics, methods & tools, assessment ❑ Learning outcomes first, then assessment, methods & tools, topics, indicators.

Competence D.2

Implement learning experiences with a 4.0 approach

n.	*Text*	*Possible answers*
D2.1	When teaching, I am able to refer to the world of work	❑ Usually I do not need that ❑ I should prepare myself first ❑ I would like to get more involved with the world of work ❑ Yes, I give examples/assignments referring to real work situations ❑ Yes, I base my courses/lessons on topics/problems risen by companies
D2.2	Am I able to implement learning activities like problem-based learning, project work, Proof of Concept, learning factory concept, real world experiences, etc.?	❑ No, our equipment is not up-to-date ❑ No, I need to be trained to that ❑ Yes, with some external help ❑ Yes, I am independent in using them ❑ Yes, and I might help others
D2.3	I make regular use of digital learning tools (e.g. videoconferencing, learning environments, collaboration tools, distance interaction tools, feedback collection, etc.)	❑ No, that is worthless to the subject I teach ❑ No, I need to be trained to them ❑ Yes, with some external help ❑ Yes, I am independent in using them ❑ Yes, and I might help others

Competence D.3

Assess learning experiences with a 4.0 approach

n.	*Text*	*Possible answers*
D3.1	How do you make explicit and share assessment goals, process and methods?	❑ I do not declare them ❑ I prefer not to make them explicit, and have students to confront themselves with unforeseen challenges ❑ I assign points to each question in tests I deliver ❑ I declare them in the course syllabus ❑ I present and discuss my assessment strategy with students at the beginning of the course
D3.2	Is anybody else involved in carrying out assessments in your courses, besides you?	❑ Nobody else ❑ Some colleagues ❑ Representatives of the labour market ❑ Students as peers
D3.3	Do you ever measure the adequacy of your assessment strategies and tools against the achievement of learning outcomes?	❑ I do not think this is necessary ❑ I never thought of it before ❑ Yes, once per year or when reviewing the programme ❑ Yes, regularly

Competence D.4

Interact in learning environments 4.0-oriented

n.	*Text*	*Possible answers*
D4.1	Which of the following describes you best?	❑ I step up to define strategies/solutions or to perform tasks ❑ I am keen to figure out a strategy, then discuss it with others ❑ I do not easily step-up with solutions, I prefer to have them built in a team ❑ I am ready to put into action strategies defined by others
D4.2	When discussing learning outcomes for a learning programme…	❑ I think the guiding criterion should be the national curriculum ❑ I think teachers should set the learning outcomes, then adapt them considering needs expressed by labour market representatives ❑ I think companies should express their needs, and teachers should set the learning outcomes accordingly ❑ I think learning outcomes should be agreed by all stakeholders involved
D4.3	When working in a multi-stakeholder environment or in a multi-disciplinary team…	❑ I tend to listen a lot ❑ I learn a lot from others ❑ I believe we help each other grow ❑ I believe we can reach our mutual goals faster

Competence P.1

Keep oneself up-to-date

n.	*Text*	*Possible answers*
P1.1	Do you make and follow a formal plan to continuously develop your skills and keep yourself up-to-date?	❑ No ❑ Yes, from time to time ❑ Yes, regularly ❑ Yes, I annually review the plan with my manager at work ❑ I usually make it, but I do not always follow it ❑ I make it, follow it and review it regularly
P1.2	Do you self-assess your preparation?	❑ No need for that ❑ Not formally, that comes naturally in my professional life: learners, colleagues, my boss assess me every day ❑ Yes, from time to time I think of my achievements and my future goals ❑ Yes: I set goals and self-assess myself against them regularly
P1.3	Do you feel yourself up-to-date with the information about Industry 4.0?	❑ No, but I know where I can find the relevant information to do that ❑ No, but I have some general knowledge ❑ Yes, I know where to look and find the information I need, and I do that on a regular basis ❑ Yes, and I feel I could support others in keeping themselves updated

Competence P.2

Information and knowledge management

n.	*Text*	*Possible answers*
P2.1	Reliability of information is key in learning and at the workplace. Which of the following applies best to you?	❑ I rely on my common sense to decide on the reliability of a piece of information ❑ I have selected a number of sources I consider reliable: I trust information coming from them ❑ I regularly check relevant information against official sources ❑ I regularly apply fact-checking about relevant information
P2.2	Teachers often look after new and catchy learning material. Which of the following applies best to you?	❑ Material I develop is somehow the result of my know-how and shows my competences: I usually prefer not to share it with others ❑ I usually feel more comfortable to keep material I develop just for me and my learners, at least for a while ❑ I usually feel happy to develop open resources, making them available free of charge (e.g. on learning platforms, social media, etc.) ❑ I usually feel happy to share with colleagues the material I develop, with a view to mutual improvement
P2.3	Industry 4.0 requires critical thinking. How do you self-assess about encouraging critical thinking of your learners?	❑ I do not address critical thinking directly ❑ I plan specific sessions on critical thinking ❑ I give assignments requiring critical thinking ❑ I regularly embed critical thinking techniques and opportunities when planning my courses

Competence S.1

Process improvement

n.	*Text*	*Possible answers*
S1.1	Please consider process management methodologies, strictly relating to 4.0 (e.g. Agile, XPM, Scrum, lean, etc.).	❑ I do not know them ❑ I know them but do not apply them ❑ I can apply them with some help ❑ I know and apply them ❑ I know and apply them, and I could support others
S1.2	Process improvement requires regular review. Please consider the relevance of reviews in your work.	❑ I review my work when required by my organisation ❑ I review my work when required by unexpected events ❑ I review my work on a regular basis ❑ I review my work on a regular basis, plus when necessary for compelling reasons
S1.3	Reviews should lead to improvement. Please consider the relevance of communicating the findings of reviews.	❑ I do not usually report and share findings of reviews ❑ I report and share findings of reviews from time to time ❑ I regularly report and share findings of reviews

Competence S.2

Innovating

n.	*Text*	*Possible answers*
S2.1	I usually take the time to explore innovative ideas and trends, with a view to more creative teaching and learning.	❑ I disagree ❑ I disagree more than I agree ❑ I agree more than I disagree ❑ I agree
S2.2	I suggest and test new approaches, methods and tools in my work, when I see a chance for innovating.	❑ I disagree ❑ I disagree more than I agree ❑ I agree more than I disagree ❑ I agree
S2.3	I always encourage open thinking among learners, by using pro-active techniques and approaches.	❑ I disagree ❑ I disagree more than I agree ❑ I agree more than I disagree ❑ I agree

3. Next steps

As described at Chapter 1, project partners will now translate the tool in national languages. When the train-the-trainer MOOC will be at a proper development stage, each partner will choose a sample of 2/3 trainers who will take the entry self-assessment test and subsequently improve their understanding of specific topics thanks to the MOOC. Finally, the same group will take the test a second time after attending the MOOC.

Partners will monitor this process and a special group on a social network (or on the learning platform) will let participants exchange information, comments and experience.

Partners are also discussing about the possibility to enrich this tool with a further series of questions, a kind of 2nd tier (upper level). Even if not foreseen in the original picture, one option could be to develop –for instance– sets of 8/10 questions per competence, more specific, more in-depth, to allow teachers and trainers assess their preparation even better.

Partners

I.F.O.A. – Istituto formazione Operatori Aziendali (IT)

Artesis Plantijn Hogeschool Antwerpen (BE)

Berufsforderungsinstitut Oberösterreich (AT)

EDUGEP (PT)

EfVET – European forum of technical and Vocational Education and Training (BE)

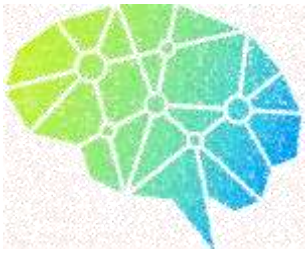
Göteborgs Tekniska College AB (SE)

Jyväskylän Ammattikorkeakoulu (FI)

North West Regional College (UK-NI)

Politecnico di Milano – METID (IT)

Zealand Business College (DK)



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