

Guidelines and recommendations for implementing training policies 4.0

December 2022



Co-funded by the
Erasmus+ Programme
of the European Union



December 2022

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Fit for 4.0: Training trainers and teachers for the 4.0 paradigm
(Project n°. 2019-1-IT01-KA202-007766).

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Content

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Abbreviations.....	1
Foreword	3
1. The project Fit for 4.0.....	4
Rationale.....	4
Objectives	5
2. Activities and output	7
2.1. Skills and competences for trainers in industry 4.0	7
2.2. Do you have what it takes? The self-assessment test	8
2.3. How to get fit for 4.0 – the trainer’s resource-kit.....	8
2.4. Putting it to the test	9
2.5. Case-studies	9
2.6. Online workshop for recommendations.....	10
3. What we learnt - recommendations from Fit for 4.0.....	11
Training providers and Teachers.....	11
Companies.....	14
Students	15
Appendix 1 – Case studies.....	16
Case 1 – Göteborgs Tekniska College (Sweden).....	17
Case 2 – Jyväskylän Ammattikorkeakoulu (Finland)	22
Case 3 – Politecnico di Milano – METID (Italy)	26
Case 4 – North West Regional College (United Kingdom – Northern Ireland)	30
Case 5 – Zealand Business College (Denmark)	34
Case 6 – EDUGEP (Portugal)	36
Case 7 – Berufsförderungsinstitut Oberösterreich (Austria).....	39
Case 8 – Artesis Plantijn Hogeschool Antwerpen (Belgium).....	43
Case 9 – Istituto Formazione Operatori Aziendali (Italy).....	45

Abbreviations

EQF	European Qualifications Framework
ESCO	European multilingual classification of Skills, Competences, Qualifications and Occupations
EU	European Union
HVET	Higher Vocational Education and Training
I4.0	Industry 4.0
ICT	Information and Communication Technology
IO	Project Intellectual Output
IT	Information Technology
MOOC	Massive Online Open Course
OER	Open Educational Resources
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 is the last project output, presenting a set of recommendations born from the partners’ experience in piloting and exploiting the training pathway and the training toolkit for teachers and trainers.

This document includes:

1. a summary of the activities carried out by partners along the project lifespan;
2. a description of the methods adopted by partners to collect the recommendations contained herein;
3. the very list of suggestions and guidelines to start/improve implementing policies for 4.0 teachers and trainers;
4. 9 case studies, performed by teachers belonging to, or related with partners, who exploited the project products to improve their training strategies or to solve teaching problems they have to face daily.

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 has been 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 were conveyed 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. Effectiveness has been assessed together with associated partners and results collected in guidelines, including also histories describing cases emerging from the pilot activities.

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 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 can 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 at next page synthesizes the project concept and model.

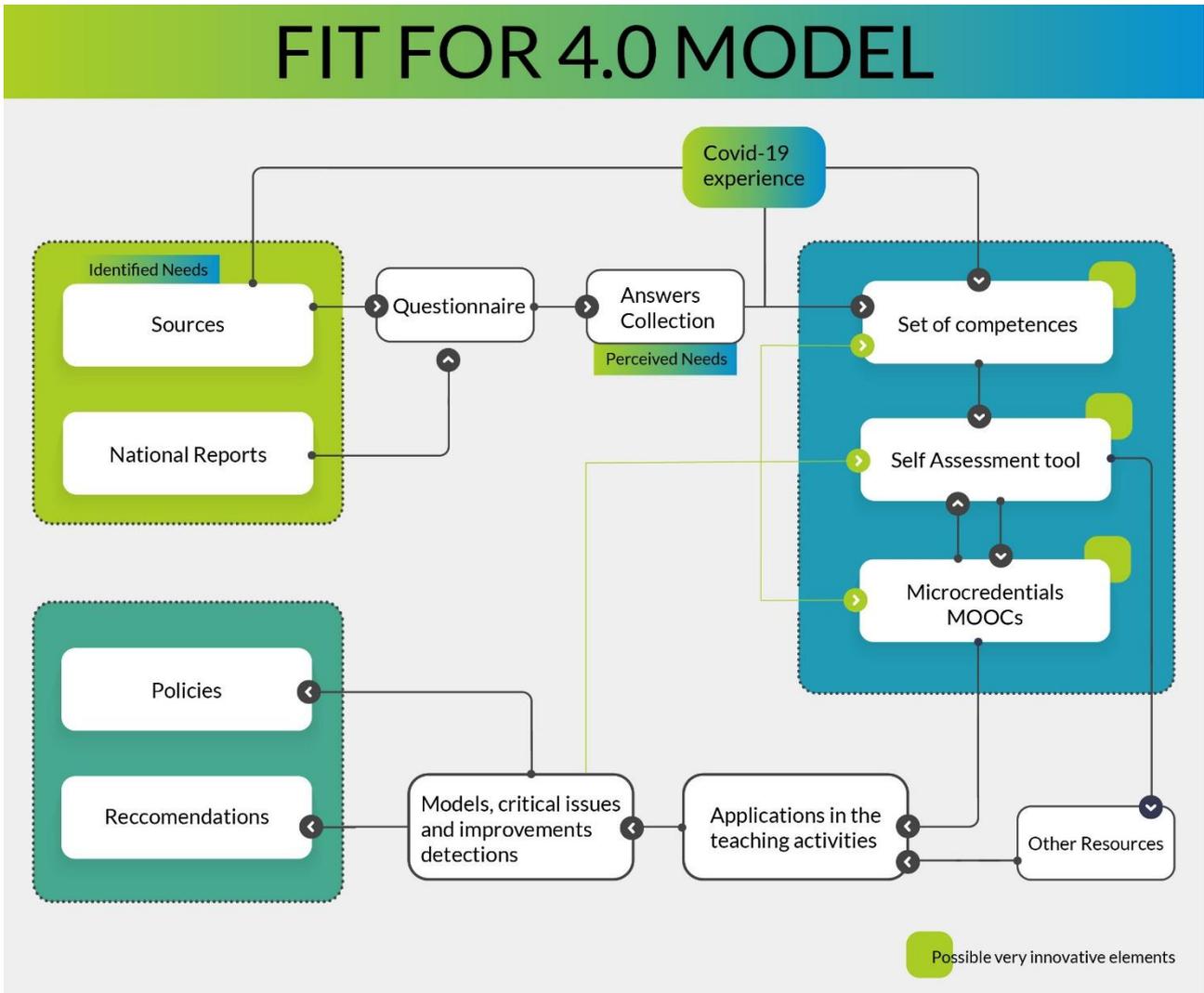


Figure 1 - The Fit for 4.0 model

2. Activities and output

Fit for 4.0 was active between 2019 and 2022 and during the project period the project delivered five major intellectual outputs;

- IO1. Set of competences for teachers and trainers
- IO2. Trainers' skills self-assessment tool
- IO3. Train-the-trainers programme
- IO4. MOOC & resource kit for 4.0 teachers and trainers
- IO5. Guidelines and recommendations for implementing "train-the-4.0 trainer" policies (this document).

Along with the last come our recommendations, based on the findings we have done for three years work, and our wish for you to use all the project output in your daily work and really "embed it" in your preparations for the transformation of the production industry. Below, you will find a brief description of the intellectual output and a suggestion on how to use them. All output can also be found on the project webpage <https://www.fitfor4-0.eu/>.

2.1. Skills and competences for trainers in industry 4.0

The first output presents a framework and description of the set of competences that teachers and trainers should possess in order to adequately facilitate students in integrating their technological know-how and gaining citizenship in the 4.0 world of work. Teaching and training for the 4.0 world does not only involve technology. Educational, personal and strategic competences are also involved and are just as important as technological ones. The skill set was defined in close cooperation with companies. The project has identified eight of them, divided into three domains (figure 2), because teachers and trainers interact and work in a supportive technological/digital context, with an **educational** focus, experiencing lifelong learning and their own **personal** development, with an overall view of continuous **strategic** improvement.

		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 competence set

Competences are described at EQF levels 4, 5 and 6 and are an excellent starting point, for example, for discussing important parameters and learning outcomes in vocational training at the above-mentioned levels. We believe that this may be particularly interesting for training institutions and companies that want to move from a strictly technological view of competences to a broader perspective in which transversal competences are considered important -sometimes even more important- than technological ones.

2.2. Do you have what it takes? The self-assessment test

The second output aims to enable teachers and trainers to assess their own level of competence with respect to the 4.0 'world', i.e. to measure in some way their readiness to cooperate in a 4.0 training and learning environment, with particular reference to didactics and the strategic competences needed to accompany technological and digital transformation.

The self-assessment test is a fun but important way to reflect on your own capabilities; how you train your students today and what you might want to do differently in the future. There are no right or wrong answers, simply feedback that helps you reflect on your professional behaviour and mindset. We believe that the impact of the test will be even greater if trainers are given the opportunity to discuss individual results with colleagues and ask themselves questions such as "...we have always worked this way, but what if we do it differently?" The self-assessment test is also an excellent starting point for approaching the subsequent outputs, because it provides suggestions on the areas of improvement required to prepare for Industry 4.0 training. In this sense, the feedback from the self-assessment test also gives indications on which/which of the micro-MOOCs contained in the trainer's resource kit might be beneficial to follow. The test can also be repeated after the MOOC to check one's progress.

2.3. How to get fit for 4.0 – the trainer's resource-kit

Once you have taken the self-assessment test, you have a clearer view of what you need to learn in order to acquire the skills and competences that must accompany the technological ones for the 4.0 world. To help teachers in this, the Fit for 4.0 project has created a pathway consisting of seven Training Units, covering all the competences described in section 2.1. The Units are numbered from 0 to 6, because the first of them constitutes the introduction and foundation of the others:

0. Introduction to the 4.0 world and how to develop your experience
1. One's own field in relation to the 4.0 world
2. Designing learning environments and experiences with a 4.0 approach
3. Realising learning experiences with a 4.0 approach
4. Evaluating learning experiences with a 4.0 approach
5. Innovation: ideas for teaching and learning
6. Training for employment and interacting with stakeholders

Each Unit is described in terms of expected learning outcomes, content, methodological suggestions, evaluation suggestions, specific requirements and prerequisites for teachers and trainers.

In principle, the course can be "filled in" with teaching material of the teachers' choice, depending on their students and their needs. The project, although limited in time and budget, nevertheless presents a possible way of substantiating the pathway.

The partners have in fact created a kit of teaching resources, which proposes the MOOC (Massive Online Open Course) as the mode of use.

The seven Training Units have therefore been "translated" into as many "micro-MOOCs", which together reconstruct the complete structure of the course, and which can be used independently by the teachers or as part of a structured, broader training programme. Each micro-MOOC takes about 5 hours to complete. It is recommended to start with MOOC 0 - Introduction, and then either move on to the MOOCs that were indicated by the self-assessment test, i.e. those that you find most interesting/useful, or use the entire course in sequence. The asynchronous online formula makes it possible to place the use of the course at the most convenient time for the participants.

Upon completion of each MOOC you receive a specific certificate. Upon completion of all seven MOOCs, an additional certificate is issued confirming the achievement of all course objectives.

2.4. Putting it to the test

The fifth and final output synthesises all the activities, and validates and validates the project results. It includes the activities carried out, lessons learned and recommendations, with the aim of providing Education and Training stakeholders with a tool to understand the nature of the 4.0 world and to support the planning and implementation of training policies. The output consists of two products: this document, available in English and Italian, and a digital brochure, in English for faster dissemination. Both are available on the project webpage together with all the other outputs.

Two main activities helped us to produce the report and brochure during the piloting of the previous work. Firstly, a series of 9 case studies in which teachers and trainers connected to partner organisations tried out the self-assessment test and resource kit and, based on what they learned, experimented with improved/new ways of training their students. Secondly, an online workshop where the project partners, based on the case studies above, worked together to define best practices in terms of organisation, mindsets and methods to support the development of soft skills in Industry 4.0. Both of these activities are described in more detail below.

2.5. Case-studies

The case studies are the result of what was originally a somewhat broader strategy to pilot the previous results of the project, and which, due to the difficulties induced by the pandemic, had to be partly redesigned. As mentioned above, the initial idea was to convey all the results of the Fit for 4.0 project in a broad and prolonged manner in the partners' networks, also building a small competition between teachers from different countries. To cope with the forced delays induced by the pandemic, while remaining within the project's execution time, the competition did not take place, but the teachers actually experienced the project results. Thus, the cases all found their starting point in a pedagogical challenge faced by the partner

institutions and/or their trainers. A sample of them, in fact, after having been provided with the description of the set of competences and of the training pathway, took the self-assessment test, used the MOOC, and, on the basis of what they learnt, identified an opportunity for intervention/improvement in the face of a problem they face in their daily work. The teachers then modified a teaching method, an approach towards students, a way of verifying learning, etc., observing and briefly describing the results of the actions taken, which are also potentially useful to other teachers who experience the same problems or who want to try a similar way of training their students.

All the case studies are collected in the appendix of this report and can be used as inspiration or a starting point for trainers or organisations wishing to improve their training organisation.

2.6. Online workshop for recommendations

Based on the case studies, the partners elaborated their recommendations on how to organise and execute training for the development of soft skills for Industry 4.0. At this stage, many partners also organised focus groups with companies on the topic. What was thought up and collected was discussed in an online seminar, with the aim of sharing recommendations, learning from each other and agreeing on a common final text.

The seminar participants were asked to structure their recommendations from a triple helix perspective, i.e. considering the different actors involved in the training processes: **training providers**, **companies** and **students**. Indeed, we believe that the system as a whole, and not just trainers, plays an important role in bringing about the changes necessary for the industrial and educational transition required by Industry 4.0.

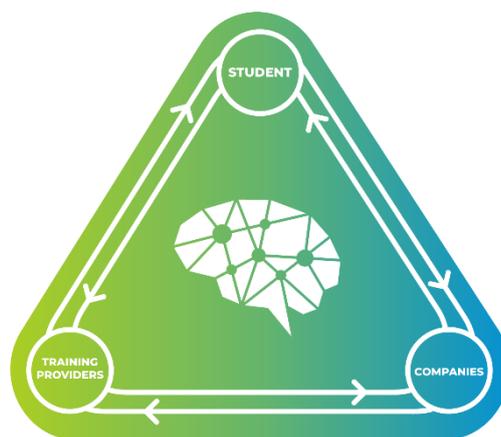


Figure 3 - The triple helix

Participants were also asked to focus their recommendations, whenever possible, on the following three parameters: **organisation**, **methods** and **mindset**. Every experienced educational leader knows that the way he or she organises training has a great impact on the quality of the outcome. Method is of course equally important in all learning situations. But in this case, our mindset, how we think about training and our respective roles in the triple helix system, can really make a difference in developing the soft skills needed to cope with the 4.0 world.

The workshop took place online, and the participants were divided into several break-out rooms where they first had the opportunity to share their respective recommendations and then harmonise them, prioritise them, and determine which ones to keep in the final product.

3. What we learnt - recommendations from Fit for 4.0

So, did we achieve our goals in Fit for 4.0? And if so, what did we learn from working on the project for more than three years? This is what we found, encapsulated in a few simple recommendations on how to develop soft skills for Industry 4.0.

Firstly, yes, we achieved what we set out to do, albeit slightly limited by the pandemic. As the description of the results in the previous chapter shows, we identified and described the competences, developed a self-assessment tool, created a resource kit including a MOOC, tested and made the MOOC itself available to other teachers and trainers across Europe and now, finally, we share with you some recommendations for the future upgrading of teachers' and trainers' competences, thus achieving all our goals.

As anticipated, the recommendations are addressed to the three 'actors' of the triple helix and cover, whenever possible, the three aspects of organisation, methods, and mindset of the people involved.

Training providers and Teachers

Organization

1. Increase opportunities for structured/additional training for teachers/trainers

Teachers and trainers are a fundamental capital and a strategic lever, not so much and not only because they can transmit knowledge, but above all because they can transmit experience, guide and facilitate learning. Very often, however, teacher training is limited to self-training, occurs informally, and is not necessarily built on their needs. We consider it essential to intervene on this aspect, increasing opportunities for upskilling and reskilling, a sort of 'maintenance' of the capital constituted by teachers. And it is important for this training to be structured, to guarantee common minimum levels of skills for the teachers involved, and to provide opportunities for sharing and comparison.

2. Strengthening close and systemic collaboration with local companies

Especially in areas affected by Industry 4.0, the relationship with companies is indispensable. There are many fields of possible collaboration: opportunities for project-work and internships for students, exchanges of views, methods and tools on teaching methods, access to up-to-date spaces, equipment and laboratories, teaching, development of common learning assessment tools and methods, etc.

3. Creating 'multi-skilled' teams and heterogeneous groups

It is important to give trainers the opportunity to interact with each other, to share information, knowledge, tools, but also to improve teaching coordination between them and knowledge of the students, their expectations and needs, and their progress.

4. Being 'smart' in quickly adapting local curricula to business/territory needs

Generally, individual schools/training institutions are able to experiment with variations in curricula and tools more often and more quickly than national agencies/ministries. They have more immediate autonomy, and can often intervene on curricula, while remaining within the existing regulatory framework, with greater freedom and in much less time than is required to make institutional changes to programmes. Companies are constantly changing, especially with regard to digital and Industry 4.0. We recommend being attentive in "reading" the needs of the territory and implementing as far as possible those adjustments that can allow students to present themselves to the labour market with a greater chance of success.

5. Commit to the inclusion of transversal and i4.0 skills in the curriculum

More and more companies say that soft skills are the ones that make the difference. Of course, they have to be grafted onto technical skills, but - in a situation of more or less equal technical skills between two workers - the one with the better soft skills will certainly get ahead. We therefore consider it decisive that the learning of soft skills becomes a declared part of training programmes, but above all of the teaching methods of trainers, who must learn to develop and evaluate them in learners, together with the companies with which they collaborate.

6. Ensuring management support in providing sufficient financial resources

The financial issue is unfortunately always present, and the limited availability of funds is a problem shared by many institutions. The recommendation in this sense is, as far as possible, twofold: on the one hand, try to make the best use of collaborations with companies, as mentioned in point 2 above; on the other hand, actively seek sources of public and/or private sponsorship in the area, also considering one's own institution and its students as a resource available, present and future, to the market.

Mindset

7. Being 'student-centred'

In a future perspective in which each student will probably be able to access directly and autonomously on the net endless, varied, inexpensive learning opportunities, perhaps advised by artificial intelligence bots, it becomes indispensable for the teacher to be able to adapt his or her teaching methods to the individual, creating time for interaction and one-to-one feedback, even in mixed presence/distance mode, and proposing the use of interactive platforms and gaming tools.

It is also part of the same point to guide students in taking responsibility for their own learning process step by step, e.g. by providing clear information on the course of study, creating an environment where students can also make mistakes/failures without necessarily being blamed, breaking down content into smaller parts with achievable goals.

8. Being quality assurance oriented

It is immediate to link the previous point with the search for continuous improvement, with regular monitoring by the teacher and encouragement to progress, with the ability to provide continuous feedforward (and not only feedback), to set training goals (knowing how to define learning objectives), indicators to verify their achievement, knowing how to formalise them, acquiring the habit of periodic and constant review of what has been achieved.

9. Encourage creativity and open-mindedness

Habit and immobility, staying within one's own 'comfort zone', are certainly comfortable and inexpensive attitudes. But the world of work in which students will find themselves competing at the end of their studies is at exactly the opposite extreme. They will be asked to be flexible, resilient, multi-tasking, quick to learn and put into practice, revising their knowledge and skills continuously. It is imperative that training organisations/schools and their teachers train themselves and their students for this type of context, proposing varied learning and testing methods, 'destabilising' them from their certainties in terms of content and solutions, proposing change as a natural condition for learning (thus avoiding e.g. 'recycling' teaching material or tests, or rewarding the mere repetition of what is proposed during lessons, stimulating independent research, etc.).

10. Creating a culture of sharing both inside and outside the organisation

Nobel Prizes are no longer won by individuals, but by groups of researchers. More and more companies are working in teams. What is proposed in point 3 above is no more than a tool to pursue the goal of having trainers who experience sharing as an inherent element of their role. This includes, for example, the willingness to share their teaching materials, to construct multidisciplinary learning objectives, to propose activities that enable them to be achieved, to define metrics and methods for evaluating learning that are shared with colleagues and companies.

11. "Cultivating" the European dimension of learning

The market of 4.0 companies is indeed local, but increasingly also (at least) European. Talking, sharing, experimenting together with other European counterparts brings noticeable benefits in terms of open-mindedness, access to methods and tools, and even funding.

Method

12. Adopt training methods that foster the development of students' transversal competences

This recommendation travels closely with recommendation no. 5 above, providing it with the 'legs to walk on'. It is crucial that teachers learn to habitually adopt project-based learning modes, based on real-life (enterprise) experiences, including the use of agile methodologies, which proceed by successive developmental steps, and which involve students in the first person (flipped classroom, debate, self-assessment, etc.).

13. Be proactive and adopt tools that are current and student-friendly

Closely linking to recommendation No. 9, it is necessary for teachers to know and be able to use the most up-to-date tools for learning that are 'close' to the students' everyday feeling and everyday life. There are numerous online tools, which can also be used free of charge and on mobile devices, that can provide valuable help to trainers at all stages of their work.

Companies

Organization

14. Strengthen close and systemic collaboration with local companies

This recommendation mirrors No. 2. on the business side. Especially in areas affected by Industry 4.0, the relationship with training organisations and schools is indispensable, because only in this way can the world of work fully express its skills needs and verify that training programmes actually deliver the necessary learning. There are many fields of possible collaboration: definition of learning objectives, collaboration in teaching, development of common learning assessment tools and methods, offer of project-work and internships for students, exchange of views, training of company staff with respect to tutoring and teaching methods, offer of access to up-to-date spaces, equipment and laboratories, possibility of being assisted by training organisations in the search for funds for internships, joint activities, etc.

15. Increasing opportunities for structured training/further training as teachers for company staff

Mirroring recommendation No. 1, this suggestion aims at bridging the teaching skills gap for company staff, with a view to increasing interaction with the training side. In contrast to countries (e.g. Germany and Austria), where company staff must mandatorily be trained and pass examinations in order to act as tutors or teachers, e.g. to apprentices, in many other places teaching skills are not trained and 'cultivated'. But also teaching requires specific technical skills, which should be built, developed and maintained in a structured and systemic way. A characteristic use of the skills acquired through this training is the hosting and mentoring of students entering the company for internships, project-work, or, more generally, work-based experiences.

Mindset

16. Being "student-centred"

Mirroring Recommendation 7, but on the company side, this recommendation aims to emphasise the importance, also for the company, of being able to see each student as an individual and unique resource, a potential, which the company may want to/should make use of in the future. Therefore, the company personnel (tutor, mentor or teacher) must also be able to adapt their teaching methods to the individual, creating time for interaction and one-to-one feedback, proposing concrete and stimulating learning modes, and which are perceived as useful by the learner.

It is also part of the same point to guide the learners in taking responsibility for their own learning process step by step, e.g. by providing clear information on the objectives of their presence in the company, creating an environment in which learners can also make mistakes/fail without necessarily being blamed, learning goals in a gradual manner, so that they are accessible and achievable in the time available.

17. Accepting to be involved by schools and training organisations: building a long-term perspective

Many companies still view collaboration with schools or training organisations unfavourably, seeing it as a waste of time and money. In reality, if properly prepared, conducted and verified,

such collaboration can prove to be an excellent medium to long term investment in meeting the skills needs of companies, finding valuable human resources and opening up to innovation.

18. For SMEs: do your best to consider Industry 4.0 (and digital transformation) from a broader perspective

In several countries, still many small and medium-sized enterprises consider Industry 4.0 as something related to obtaining loans or financing to modernise space, facilities and equipment. These companies neglect the human factor, which is, however, among the fundamental components of any transformation, including digital transformation.

Students

Mindset

19. Openness to take responsibility for the learning process

As has already become evident for training organisations and enterprises, students are also advised not to passively undergo learning and transformation processes. Often training systems (and many lecturers who implement them) are structured in such a way that students feel like objects, a passive part of the learning process, only called upon to listen, memorise and repeat without modification, possibly asking as few questions as possible. On the contrary, our recommendation is to feel themselves to be active participants in the learning process, to come forward to collaborate in defining their own objectives, to be realistic and clear, to show curiosity, to ask questions, to think critically, to be open to change, adaptable and flexible, realising that learning does not only take place within school walls.

20. Give continuous feedback to training providers and companies and experience it as a 'normal' part of one's professionalism.

If it is right and proper that teachers give feedback and feedforward to students, equally crucial is the feedback that students can give to teachers. The invitation is therefore to 'seek out' the teacher (whether trainer or company) to talk and discuss, not only about the contents of his or her discipline, but also with respect to one's own learning objectives, expectations, difficulties, study methods, etc. Having made it clear that the teacher is a facilitator of learning, then it is important that the students recognise this role, and confront themselves with him also with respect to the factors that such learning helps and to the development of their own transversal skills.

Appendix 1 – Case studies

The following pages collect 9 experiences carried out by teachers belonging (or connected) to as many project partners. These teachers, after taking the self-assessment test and consequently following in part or in full the MOOC, exploited their learning and adjusted, modified, rethought of parts of the courses they usually teach, to make such courses more effective to their students.

Case studies all show the same structure: first, a short introduction about the relevant partner is provided for, followed by some background information on the context in which the case took place. Then, the practical problem at core of the study is presented, complete with the actions taken, the results achieved and, when relevant, the contacts you can refer to, to learn more.

Case 1 – Göteborgs Tekniska College (Sweden)



Flipped classroom with blended learning

Introduction

Göteborgs Tekniska College is an industrial technical training provider in Gothenburg, Sweden, with approximately 400 pupils on EQF4. The school is a collaborative ownership between Volvo Cars, Volvo Trucks, and the City of Gothenburg.

The opportunity the case offered was to increase teacher lead feedback in the classroom by using pre-recorded video lectures to free teacher time, i.e. flipped classroom with blended learning. Furthermore, this method would also help to adjust the level of difficulty to the individual learner. Some of the success metrics were saved time, more focused students as well as learning pace adjusted to the individual students.

Background information

Two teachers participated in the study: a teacher of industrial subjects, and one of entrepreneurial courses. The methods were tested in the courses “Industrial production methods” with third year students and “Entrepreneurship” with second years, both EQF level 4.



The course “Entrepreneurship” aims at teaching the students about the conditions of entrepreneurship and helping them in practicing skills needed to run a business. A few examples of learning outcomes are marketing, product development, sales techniques, bookkeeping and project management.

The course “Industrial production methods” aims at providing the students with an understanding of different production methods, as well as learning how to choose production methods with regards to known production bases and material costs. The case focuses

particularly on how to train for designing for additive manufacturing.

In this case the teachers decided to find pedagogic solutions on how to:

- *Find time to give individual feedback to all students*
- *Teach students to act and think independently*
- *Adjust level of difficulty to the individual student*
- *Match each pupil's strengths with the right methodology*
- *Facilitate for students who have missed lessons due to absence*

The Challenges the teacher/school faced

In both courses students leave school for internship during various periods of time, which results in individual learning paths and timelines for all students. Recurrent absence among students is also a problem for teachers who then must provide training for the same learning outcomes on several occasions.

The course in entrepreneurship is entirely built on project work. To be able to participate in project work, the students need not only knowledge in accounting and marketing but also soft skills, such as communicating in the project organization.

Using a textbook as the only source of learning makes students passive. They only acquire knowledge, not skills nor competence. They don't become entrepreneurial.

In third-year courses, students have acquired different previous knowledge and thus different working pace. They also have different levels of ambition. It is difficult for the teacher to meet students on different levels in a large group.

The individual students have different personal strengths which will not be met when the teacher follows the same teaching technique for all students.

Teachers find it difficult to find time to give individual feedback to all students.

“Due to safety reasons, I want to be a part of laboratory exercises, rather than theoretical learning. I also want to be a part of lab sessions to see that students implement what they have learnt. Being part of the labs also makes more time available for evaluating what the students are doing.”

Johan Löfgren, teacher of Industrial Methods

Improvements/ measures/actions

Participants in the experiment were part of a group of third year students from the field of industrial design. Following lessons learnt from mini-MOOC 3, I tested the use of pre-recorded instructional videos instead of lectures and the methodology where students were directed into watching the videos instead of the teacher responding to questions of general character. The content of the first video was how to configure a 3D printer, how to prepare a CAD model for 3D printing and how to start a specific 3D printer. The content of the second video was how to design for 3D printing. (Johan Löfgren, teacher of Industrial Methods)

I tried the flipped classroom approach suggested by mini-MOOC 2 in order to enable the individuals in the course to access the materials and made them the owner of their own learning process. This included my presentations and materials online, as well as links and directions, rather than direct answers to how their project group could move forward. The individual groups could then decide if they wanted to research marketing, accounting, business model design or other subjects for their start-up process.

The groups had the opportunity to work out their own learning-path through the projects and my role was less of an instructor and more of a coach who would help guide them through their challenges rather than giving the entire class a lecture that half of them did not need at

the time. Another benefit for me as a teacher was that it enabled more facetime with the groups and a more hands-on problem-solving methods for group dynamics. (Daniel Andersson, teacher of Entrepreneurship)

The Results

I estimate that using a 30-minute instruction video instead of giving a lecture, saves 1,5h per each 3,5h. When the students asked questions of a general character, they were directed back to the videos and the teacher was free to focus on coaching and giving feedback to the pupils.

From my experience, the atmosphere in the classroom has been good, with slightly more focused students, since they have been able to work at their own pace.

I will also hand out a survey to the students to catch their experiences of the blended learning approach compared to the more traditional methods they have experienced earlier in other courses.

Everyone has been able to work at their own pace. Fast learners haven't had to wait for slower ones and slower learners or students who have been absent have been able to watch videos multiple times. The teacher hasn't had to provide additional lectures for the latter.

A disadvantage of using prerecorded videos is that it is difficult to up-date the content compared to when lecturing, since a video needs to be edited and new or additional content needs to be recorded.

Another disadvantage, similar to the one described above, is that it is not possible to easily adapt the content to the students' personal interest or previous knowledge.

It is also difficult for the learner to get a fast overview of the content of a video compared to a textbook or presentation.

It is also hard for the teacher to get feedback from the students while they watch a video, since you cannot have eye contact with the student while they watch a video, as you would while lecturing.

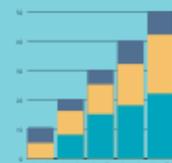
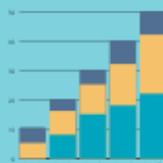
Some ideas have risen, on how to use the methodology in courses similar to Entrepreneurship, where students leave school for internship during various periods of time, which results in individual learning paths and timelines for all students.

The result could be measured in time spent with individual groups. Instead of lectures and exercises for the entire class for 180 minutes and an additional 60 minutes of group work, I could work individually with the groups 180 out of 240 minutes. Not only did the method give me more facetime to help them with their assignments but it allowed me to coach them on soft skills such as group dynamics and conflict resolutions.

(Johan Löfgren, teacher of Industrial Methods)

To develop the methodology, I would decouple myself further from my teacher's desk and use online tools for self-evaluation. I find that my skills as a teacher are better used in a dialogue with the students, because now I can adapt my communication further depending on the recipient.

(David Andersson, teacher of Entrepreneurship)



Case 2 – Jyväskylän Ammattikorkeakoulu (Finland)



Online feedback discussion of practicum

Introduction

Student learning at work contexts' has increased in vocational and higher education. However, practical periods require reflective feedback discussions with their teacher and a workplace tutor for deep learning. Feedback discussions online will save time and costs for all, but they require redesigning the structure of the discussion.

- *Students, teachers and workplace tutors felt online feedback discussions being flexible*
- *Online feedback saved travelling time and offered more time for reflective discussion*
- *Structure that could be used in work places in discussions with their internal and external customers*

Background information

JAMK's School of Professional Teacher Education offers teacher education for VET and HEI teachers. A strong focus is set on the interaction between the education/training- and the work-environment.

At present, the usage of various digital tools for learning at educational organisations and workplaces has increased. More, collaboration between these two stakeholders will grow and deepen, requiring easy and flexible interaction.



The Challenges the teacher/school faced

IT is useful, but authentic collaboration and interaction between the University and the companies are difficult to achieve, simply using emails or writing reports.

Places where our student have practice training are spread around the country, increasing teachers' work time and costs for travelling. As a matter of fact, although teachers' visits to workplaces are invaluable for interaction, a lot of time is required for travelling. This might lead reducing the number of face-to-face discussions between students, teachers and workplace tutors.

To solve this issue, based on lessons learnt from micro-MOOC 6, some teachers tested arranging feedback discussions online. They reported online offering new possibilities but also uncertainties particularly for the technical implementation. In this case study, a team of teachers created a model that can be used to ease the implementation of an online feedback discussion.

Improvements/ measures/actions

To conduct a successful online meeting using tools like Microsoft Teams or Zoom or other video conference applications, you have to be prepared. We have found out best practices about what should be done before, during, and after the meeting.

Before the meeting

- **Choose the Right Technology.** Choose a technology that you know how to use. Make sure you can advise participants to use the camera and microphone.
- **Send the link and instructions.** Having clear objectives for the entire meeting will help the student and workplace tutor to prepared well in advance.
- **Consider privacy.** Ask to join the meeting from a space where can confidentially be ensured.

- **Test the tech before meeting.** Before the meeting ensure that everything works properly (at least 15 minutes).
- **Minimize background distractions.** Use headset to speak. Use virtual or blurred background. Also instruct the participants.

During the meeting

- Give everyone the chance to speak at the start.
- Use body language (e.g. eye contact) to show you're engaged in the conversation.
- Maintain two-way communication
- Honor the relationship
- Ask open-ended questions
- Encourage and support student reflection
- Remind the next steps
- Close your meeting with a summary

After the meeting

- Reflect the discussion and your role during the feedback discussion
- Evaluate technology to improve future online feedback discussions

The Results

During the practical internship period, an open communication between the student, the supervising teacher and the internship tutor is important. Effective information flow between these parties creates a positive atmosphere and strengthens learning experiences. The result of successful cooperation supports students' personal and professional growth.

The teachers implemented the method of online feedback discussions with their students. Afterwards, teachers gathered to a group reflection session to share their experiences. In general, after arranging and facilitating some (2-3) online feedback discussions, the technological environment felt familiar, and the conversation became more natural.

Here are some teachers' quotes:

“At first, I was nervous about whether all the attention would go to technology. It was a relief the technology worked smoothly, and the conversation started so naturally.”

“I was afraid that students wouldn’t participate in the discussion. I was surprised that they acted so naturally in this environment.”

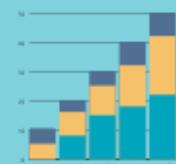
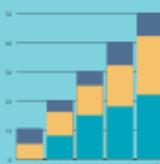
“Even there were some technical issues with audio, I will definitely use this method again.”

Experiments showed that the objectives of a feedback discussion can also be achieved online. The most significant advantage was the time saved. The teachers thought about allocating the saved time to arrange extra feedback discussions (individual/group) during the practical work periods. However, visits to workplaces were still considered important in terms of working life co-operation and networking, so we decided not to abandon them, just reduce.

The experiments increased the teacher's efficacy and self-confidence to work in online environments with different stakeholders. Teachers felt these small-scale practical experiments being empowering. Experiments inspired them to develop their own work in general. The group reflection discussions were experienced meaningful, and they motivated to explore other co-creation possibilities with colleagues.

The procedure is now being transferred as a standard one to all JAMK.

“Awesome, we need more this kind of discussions!”



Case 3 – Politecnico di Milano – METID (Italy)



Managing teaching in the 4.0 and post-Covid-19 era

Introduction

We involved in the experimentation of the course two figures within the Politecnico di Milano who deal with instructional design and teacher training in the field of didactic innovation.

The opportunity we tried to seize was to have the chance to confront different international realities in order to receive insights on the management of didactics in an advanced and changed technological context such as that of Industry 4.0 and, above all, the post-covid19 era.

The two trainers involved are: Bianca Santolini and Sara Pandocchi.

Background information

Bianca Santolini, who has been working at the Politecnico di Milano since 2016, has been training teachers to design and manage blended teaching in their courses. She therefore holds numerous training meetings -that often take on the structure of workshops- in which she endeavours to teach the best practices for managing courses that, having together online and in-presence students, must manage and integrate both the more classic didactic aspects and the inevitable technological aspects. In this context, it is clear that traditional didactics must undergo a transformation: Bianca's courses therefore also deal with didactic innovation, in particular how to activate the classroom, both online and in-presence. The



difficulties she encounters are often related to the online dimension and how to find the most effective ways of involving online students in the lesson.

Sara Pandocchi has been working at the Politecnico di Milano since 2020 and trains teachers on more specific aspects, involving technological tools such as Wooclap, FeedbackFruits, Jamboards, Miro, etc. Her courses focus on planning how to use these tools within a lesson. She is also involved in designing teaching experiences using VR technologies.

Both Bianca and Sara teach courses in which they explain how to integrate the technological dimension in didactics, and this inevitably presents them with challenges; it is for this reason that we thought they might be the ideal candidates to pilot the MOOC "Training pathway for the development of teachers' non-technological competences."

The Challenges the teacher/school faced

The challenges teachers increasingly face in their courses are related to the participants' lack of digital skills. Their students are actually themselves lecturers in their specific disciplines and the difficulties they report in running their classes are often related to:

- Internet connection problems that do not allow online participants to follow lectures easily;
- problems related to the management of online students, it is not easy to understand how to involve them in the lesson:
- difficulties in managing several technological tools simultaneously (chat, student response systems, web conference platform);
- difficulties in getting participants in face-to-face classes to interact with online ones;
- difficulties in managing breakout rooms.

These issues that teachers in general face in their classrooms are often, though to a lesser extent, those that Bianca and Sara face during their training courses. Since their task is to try to provide the best possible solutions for teachers

in the management of blended classes, they decided to experiment with the "Training pathway for the development of teachers' non-technological competences." to try and see if there were any useful hints in an international context that could be brought back to our national context.

Improvements/ measures/actions

We organised a focus group with Bianca and Sara in which we asked them what impressions they had of the MOOC and what actions they plan to take in their courses.

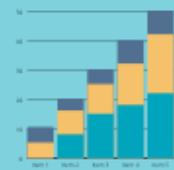
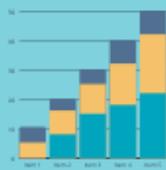
The first consideration they gave us was on the use of MOOCs in general: they offer a very interesting chance, in that they can be used to leave to individual study all those concepts that would require a lot of time for frontal classroom explanation, which necessarily decreases the attention. This is especially true for online students: acquiring information related to concepts, methods, strategies, processes through the "passive", or rather "non-interactive" use of a source (for example listening to a frontal lecture or reading a book) from the distance could be boring or frustrating. In this context, the action they will take is to delegate part of the content to the students in order to leave room in the classroom for more interactive activities.

Another consideration they brought back to us was on the use of the persona/scenario methodology which they found very useful for the presentation of the topics. Starting with the presentation of a real case or situation can help and accompany the explanation of a theoretical concept by increasing and improving understanding for the students. They will also try to use this methodology in their training courses.

The Results

A general remark we can make and which we did with the expert help of Bianca and Sara was

the understanding that the world is changing for everyone and that the pandemic has given a strong impetus towards the technological dimension. What particularly emerged from the Fit for 4.0 course course was its international character, which is evident in the micro-MOOC structure, that allowed them to understand the directions that the different European realities are taking about hybrid teaching.



Case 4 – North West Regional College (United Kingdom – Northern Ireland)



Re-thinking a digital learning platform for apprentices

Introduction

This case study considers students who are undertaking apprenticeship courses where they attend the College 1 day a week and work with their employer 4 days a week.

Background information

The College typically uses a “traditional” LMS, previously it had been Moodle, now it is Canvas. Many students on apprenticeship courses find a traditional LMS quite cumbersome and are not very keen on engaging with it to access learning materials and learning activities. The challenge for teachers is to put in place a digital platform that does the same as the LMS but that the students will find useful and use.



The Challenges the teacher/school faced

For over fifteen years Teachers at NWRC have been required to use a digital learning management system to:

- *host the learning materials they use with their students;*
- *provide access to learning activities, most often quizzes also to allow online upload of assessments, and*

- to communicate with students in an ad hoc way, for example to inform them of changes in schedules, announcements about the course and so on.

Students who attend the College on a daily basis would be familiar with the LMS as their teachers would routinely open the system in class and access course notes from it.

The problem is with some part-time courses, especially some of the apprentices who only attend the College one day per week and work with employers the other four days. They have not been positive about the LMS and their teachers have had great difficulty persuading them that the LMS is a necessity for them to access regularly, especially when not in College

The challenge is to find a solution for this lack of access. It manifests itself in particular where:

- there are activities the student must do in the workplace, where a particular skill or approach has been covered in a class and information about that is on the LMS, or
- where the student is required to do an activity in the workplace that is part of the course assessment and the student is required to electronically submit assessment evidence for the teacher to view and respond to.

Improvements/ measures/actions

Following the suggestions learnt through micro-MOOC2, the first step in getting the solution was for the teacher concerned to engage with one of the digital support team, Mark. The team member discussed the issue with a colleague Lyn, who suggested that the first thing to do is talk to the students involved and see what was their reluctance to using the LMS.

Talking to the students revealed that they simply found the LMS to be:

- Not intuitive to access
- Difficult to find what they needed
- Difficult to upload the work they did for assessment – often the evidence was

photographs or videos of practical tasks they did on building sites.

The other issue was that they associated the LMS with PCs, that is, getting access seemed to them to be very PC focused, not easy to do when out on a building site, so they had to wait to get home or back into college.

Lyn and Mark agreed that a useful solution would be to try out a new specific tool (OneNote/ClassNotebook). Some reasons were that:

- the structures of resources was very intuitive
- it had excellent mobile capability, meaning that it could easily be used on a mobile phone.

The latter point was of particular importance when considering how to ease the task of uploading assessment evidence that was generated on a building site.

So, a ClassNotebook was created for a group of the students involved and used in place of Canvas. Very quickly this proved to be very successful, in that student found it easy and intuitive to use, both for accessing class notes, both during time in the College and when out working. In addition, uploading samples of work done, in the form of photos or videos, was found to be very simple by the majority of the students.

Lyn was very well experienced in using ClassNotebook as she uses it exclusively with her own students, who are doing a practical course. This meant that she was able to:

- provide practical examples of how it would work
- deliver the training to staff, and
- provide practical support once up and running.

The success of using ClassNotebook with this group provided clear evidence of its potential for similar groups of students and their teachers.

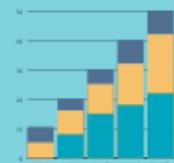
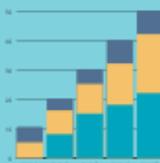
The Results

The outcome of the course of action was that teachers were getting more assessment evidence on time and were spending less time supporting access problems from students. The latter point

was a big issue for teachers as in the past they had lots of calls from students frustrated that they were trying to get assessment evidence uploaded on time, but were simply not able to achieve the task. The saving in time was a plus, also the general satisfaction of the students. Also, they were pleased that the students indicated that they would use OneNote for other purposes outside of the course requirements as they were very impressed that they could get some much benefits from using the system with their mobile phones.

There is no easy way to get specific results from this piece of work. Satisfaction of both staff and students has been reported but there is not real metric that can be used to gauge the task's success, apart from the anecdotal reports from both.

The teachers involved were very pleased with their learning through the MOOC. They could see its potential in a lot of the work that they do. This included plans form most of them to extend the experience to other issues they face and other students they have. They were impressed by the easy way they could set up a schedule of learning notes and activities that could be presented to students in a way they found easy to comprehend.



Case 5 – Zealand Business College (Denmark)



Trainer resources

Introduction

For industrial VET teachers at ZBC, developing their teaching skills is a passion and therefore lifelong learning is a natural part of their work life. Ongoing update of their technical skills and teaching equipment is vital, however soft skills are equally important. A closed or stagnant mind of a teacher stops personal growth and also the teaching of students. Soft skills such as adapting to new knowledge of the Industry 4.0 area is essential.

Background information

The everyday schedule of a teacher is busy due to short periods of teaching one student before he/she returns to their internships at the work places. Therefore, teaching must be precise, clear and updated for the few weeks of teaching each teaching period.



The Challenges the teacher/school faced

In a school, often the schedule is busy and tasks too many, and with limited resources. How does a teacher make time for new ideas and personal growth?

The MOOCs in the Fit for 4.0 project can help with setting the mind and creativity free as to how to find resources mentally and in soft skills.

That is why, in our College we had 12 teachers having a try of it.

Improvements/ measures/actions

Soft skills as communication have great value. Communicating with the local manager about getting time for updating one's technical knowledge is important.

The MOOC's Fit for 4.0 self-assessment proved to be an opportunity to take a look inward personally, at the colleagues, the local manager and the leadership, the students, and the cooperating companies. Taking the time to think about hidden new opportunities and ways of working, learning, and teaching, provided with great value.

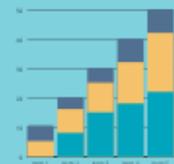
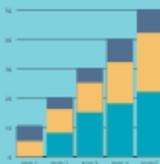
The Results

The teacher's self-motivation and drive is key in looking both inward for hidden soft resources and also outward in the communication with the world around him/her.

All teachers were enthusiastic of this pilot round. Here is a couple of quotes:

"The MOOC as a tool of self-development and improved perception and flexible relationship with the people and companies around him/her, can make the world of a difference, thanks to the Fit for 4.0 project."

"This is recommended and valuable to be shared with the entire organization in ZBC and relevant companies."



Case 6 – EDUGEP (Portugal)



Trainer resources

Introduction

For EDUGEP and all our local partners (schools, Training Centers, companies, among other organizations) lifelong learning is central. Often, in Portugal, continuous training is not privileged, rather it is placed in the background within organizations. However, and in what concerns Industry in particular, the training of employees is crucial in order to meet the market needs. With the Pandemic COVID-19, the need for training in the digital area, gained enormous prominence and the population realized the real importance of technologies. In this sense, the training of teachers and trainers in digital transformation and Industry 4.0 has gained even more prominence. It is now at the forefront of the government's goals and objectives. Thus, this project has gained even more prominence and relevance for all.

Background information

Because of the high engagement of teachers, in terms of class schedules, there is a growing need for shorter, more effective training sessions, prepared with materials that are as practical and "replicable" as possible. In order to facilitate their subsequent implementation.



The Challenges the teacher/school faced

EDUGEP teachers and trainers use a digital learning management system. After the pandemic, in Portuguese schools, the use of digital learning management systems is becoming more and more frequent. The focus on training teachers and trainers in the

development of digital competencies is increasing.

There are some barriers to this technological advance, namely access to the internet in all locations/schools.

Our task, starting from what our teachers learnt from the MOOC, was therefore to support teachers in their problems with designing digital courses keeping into account the schedule, the many tasks, and the limited resources.

Improvements/ measures/actions

Teachers' soft skills as communication, leadership and team work have great value. Is very important to think about hidden new opportunities and ways of working, learning, and teaching.

5 of our teachers took the full MOOC pathway, and exploited their learning in designing their subsequent course.

Here is what they reported they learnt:

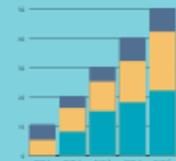
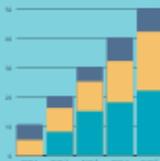
- in distance learning, it is essential to select the platforms that will be used and ensure that access and use is easy, intuitive and free for trainees, trainers and organizations;
- the initial investment made in the construction of a course and all its materials in distance learning (whether synchronous or asynchronous) is later compensated when it is used by a larger number of trainees with a reduction/optimization of the resources already invested;
- thus, it is fundamental that in terms of platforms and training support software, there are as few changes as possible over time;
- a good practice in the construction of an online course is the construction/availability of a guide with all the necessary guidelines for the good use of the platform or platforms adopted;
- It is also very important that all the information about the course/the training

program, is available and that it contains all the information about the training objectives, the evaluation methods, the schedule. This ensures that trainees can clearly understand how much time they will need to invest in that training and what is the final goal of their learning.

The Results

We now have a core group of teachers not only able to keep their courses up-to-date and “student-friendly” from the didactics point of view, but also able to act as “ambassadors” towards the others. We plan to exploit the MOOC with all our teachers. The clear structuring of the MOOC modules and the way they are systematized will be a way to convince teachers to use the content in an agile and intuitive way.

From our feedback collection, having easily accessible and implementable content and materials clearly emerged as one “plus” of the MOOC.



Case 7 – Berufsförderungsinstitut Oberösterreich (Austria)



Designing learning environments

Introduction

BFI Vocational Center is located in Gunskirchen and is educating adults for vocational jobs in the metal producing sector. The background of the apprentices varies a lot. For some people the training is in a completely new field, others have lots of practice but no formal qualification on the job yet.

The school or training center is a cooperation and gets lots of appliers from the labour market. Interests of the participants are also widespread.

Background information

The trainer Willy H. is teaching in a vocational training center BFI Gunskirchen and has a technical background in e-learning as well as in metal processing and mechanical engineering. He teaches students in the VET subjects. The students have a range from 20 up to 50 years and are mainly male (90%). His classes usually consist of about ten people in total. Willy has been teaching since 2000 at the BFI, during this time he saw lots of trends in teaching coming and going. But none of them addressed a development that he observed over the years and that is an ongoing issue for him.

Which is:

“How to support the varied individual learning needs of their students or how to design engaging learning tasks that develop students' skills.”





Especially challenging for Willy is that the groups he is teaching is really heterogenous and has different needs.

*The teacher decided to face this challenge because he could see a trend over the last decade or so that participants are more and more individual, **their express** their needs as individuals and demand from teachers to respect and facilitate their different personalities.*

The Challenges the teacher/school faced

Willy has lots of challenges, when it comes to design a learning environment suitable for the participants.

Over the last years the heterogeneity has increased rapidly. The challenge especially for the teacher is to find and set up a learning environment that fits the many different subjects he teaches, all somehow in relation to the metal producing sector. From welding (practical and theoretical) to construction to product design, etc.

Among his challenges are:

Welding: some students have lots of practical training and are not keen to undergo more welding practice, others have no experience at all at welding. He quotes: "I have troubles finding a way to teach both groups at the same time, because the welding practice takes up all my concentration, as my observation is mandatory when they practice with actual welding equipment. In fact, some students have already excellent knowledge of the theory but find it hard to execute a precise weld. If I am there taking care of them, I cannot manage at the same time to get the other group improve their already existing skills."

Product Engineering: in product engineering the apprentices have to prepare a fictional product idea with a feasibility study that is connected to their actual workplace. Due to the heterogeneity of the students, it requires a huge preparation and work to assess the progress of the students. 10 Students equal 10 different companies with probably 10 different fields of expertise.

“Nevertheless, I believe I/we can handle anything, if we adapt to our students’ needs.” Willy H.

Improvements/ measures/actions

One improvement was to adjust the existing LMS.

To better understand the target group, driving inspiration from the self-assessment and from the MOOC developed by Fit for 4.0, the teacher implemented a self-assessment test for the students, which focused on different learning styles and on the experience and skills they can bring to the training, to their own benefit and to others’.

Downstream the self-assessment, Willy agrees with each student an individual learning path along the course. The LMS is crucial to visualize and organize the individual training paths. Ideally the LMS is an advanced organizer for the students and their learning needs.

The Results

Finding metrics for the learning improvement is hard. However, with the adapted LMS the students learned to self-assess themselves and had a visual guide where they need to improve.

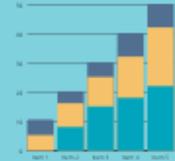
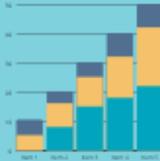
As a result, the teacher now can work more focused and with smaller groups who deal with the same topics, issues, etc. whilst others can learn individually on individual topics with the LMS, and then switch. As a result, the teacher has more focus and time on the topics that they work on as a group.

Through using the LMS in class, it was also realised that the students exploit different tools. Some only have a mobile phone and no laptop. Taking inspiration from mini-MOOCs 2-3 and 4, this again had an impact on the lessons. To enable consistent learning, BFI Gunskirchen decided to provide the students with laptops for the duration of the training.

“The set-up of the LMS is a bit complex, but once accomplished, it is very helpful and makes working

with students much easier. I have to thank Fit for 4.0 for giving me good clues.”

Willy H.



Case 8 – Artesis Plantijn Hogeschool Antwerpen (Belgium)



Entrepreneurship and theatre

Introduction

We at AP UAS are strong in entrepreneurship. Making the link to the industry 4.0 was consequently an easy step. Our case study comes from the real life of a young entrepreneur: young both in age and in expertise. All our teachers tend to bridge the gap between study theory and work field practice. We work since long with case studies supplied by companies that house our interns. This case study however comes from the company of an AP UAS student entrepreneur.

Background information

Teacher and students discover together the case study provided by an AP UAS student entrepreneur. This student entrepreneur makes educative theater. Since the topic is special and somewhat out of the box, but very much linked to our job as teacher / student, we believed it to be perfect for this purpose.



The Challenges the teacher/school faced

In our school we highly appreciate teachers with a background / expertise in the private business sector. However, to bring them into the job of teacher, within a school context, is often quite a challenge. The MOOCs as developed in the Fit 4.0 project can help a lot.

When a new teacher comes in, we try to coach him/her into new teaching and learning methods. Often 'teaching' is still understood as

how it was done 50 years ago. That has now completely changed. Also: the way of assessing and the internships are of special interest to our AP UAS teachers.

So, we asked this new teacher/entrepreneur to take the self-assessment and the MOOC first, and then to review the design of his course.

Improvements/ measures/actions

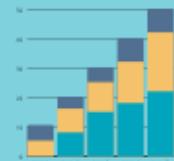
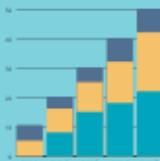
Our student entrepreneur, who makes this special form of theater, keeps education a mirror ahead. By using the MOOC, he had the chance to adapt its course in objectives and contents.

He especially appreciated the way the MOOC contributed to opening up his mind set.

The Results

The Fit 4.0 MOOC in our university college will continue to be a tool to consult for future and current teachers who understand the need of lifelong learning, of adapting to a rapidly changing society. In the future these MOOCs might even become a model, a basis from where new learning tools for teachers (and for students!) will be created in our school.

The important thing now is to spread the information amongst our teachers. Already in preparing the MOOC 5 we spoke to many teachers from different departments and there was a lot of interest from them. A lot of interest also to see and learn from colleagues, on top of the learning from project partners' teachers. This will make for a broad dissemination within our institution.



Case 9 – Istituto Formazione Operatori Aziendali (Italy)



Soft skills and flipped classroom

Introduction

I.F.O.A. is a private, not for profit training centre and employment agency based in Reggio Emilia (Italy), and delivering HVET courses to the unemployed (young and adults), to adult individuals looking for upskilling and reskilling, and Continuous vocational training to the employed. Courses for young people are mostly at EQF level 4 and 5, and offer programmes delivered about 50% in the classroom/in laboratories, and 50% as internships at the workplace.

All courses are designed and delivered in close cooperation with the labour market, and cover different domains and sectors, always related to the digital and/or green transformation.

All teachers and trainers at I.F.O.A. are hired on the labour market, as skilled professionals with proven expertise in the subjects they teach.

Overall, I.F.O.A. involved 8 teachers as a sample group to test the MOOC. For the purpose of this study case, we selected Mrs. Laura Sargentini, a lecturer at I.F.O.A. for many years, an expert in E-commerce, a specialist in online sales platforms such as Ebay and Amazon, and an innovator, dealing with bringing together technology and the human factor.

Laura has since long coupled her passion for teaching (which she combines with her work as a consultant) with a focus on didactics, and therefore saw our MOOC as an important opportunity to consolidate her skills and see if there were new tools and methods for her to use in her courses.

Background information

Laura is a senior Web Project Manager, eBay Specialist, Social Media And Digital Marketing, eCommerce Specialist. Since 2001 she manages “Meraviglie Cosmiche” (Cosmic Wonders), a network of digital



marketing professionals, offering consultancy services to SMEs, including training. Since May 2019 she supplies training services in technological and digital innovation fields for the development of business projects under the Industry 4.0 national plan.

The Course we chose for this case is "Higher Technician for future-oriented agri-food systems: sustainability, skills and innovation", at EQF level 5. It targets at fulfilling the demand for innovative and specific skills in precision agriculture, smart farming and 4.0 enabling technologies in the agri-food sector in harmony with Goal 9 of Agenda 2030, which aims to promote innovation and fair, responsible and sustainable industrialisation.

The Challenges the teacher/school faced

Laura understands she has to make a lot of decisions at all times, so the relationship with the students is constantly changing and she has to adapt all the time by stimulating and giving targeted answers. At the same time, she acknowledges that the same situation, "mutatis mutandis", will be faced by students at the workplace, where they will be called to combine their technology skills with their ability be flexible, creative, responsive and effective.

Therefore, she took the self-assessment tool for herself, then, following the feedback she got, she took micro-MOOCs 0, 2, 5 and 6. As a consequence, she identified the three activities described below as interesting and useful to facilitate this task, and to train students at the same time.

Improvements/ measures/actions

Laura experienced the following 3 lessons learnt/applications of the MOOC:

- *using Google forms to take the final test to the class, which not only allowed the exam to be concentrated in a short time without the use of paper, digitising the test, but also allowed an instant final evaluation that the students could see immediately at the end of*

the test and to highlight errors. It then allowed for a review of the assignment in class, to represent with a spreadsheet all the results in an automated way and to share the results immediately and easily with the course tutor.

- the first time she met the class she asked what background and soft skills the participants thought they had: this helped to calibrate the demands on the class, to better define the objectives, to create the working groups (they did business simulations). This is something that benefits both the teacher and the class because they tell their stories, set out their expectations after the course and feel more involved.
- when carrying out an activity of business simulation, she adopted a flipped classroom approach: she started by giving students the task of thinking and coordinating as a group a web project within a company... so they got involved much quickly, and they themselves found out what they should achieve, and what they could do to it, in the lesson that Laura delivered afterwards.

The Results

These are the outcomes Laura reported on the student side:

- great classroom climate, strong student involvement and greater effectiveness of the lesson;
- much better understanding of the tasks assigned;
- starting from tools they already knew, students were able to invent their own, new ones;
- each and every student declared they enjoyed the sessions, amused themselves, and did not feel the load they were used to bear with lectures and frontal sessions.

And on the teacher (her own) side:

- improved communication with students, with the feeling of this resulting in an

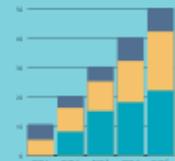
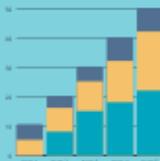
improved teacher trustfulness and reputation;

- personal feeling of well-being;
- time optimization in the preparation of the lessons that followed the flipped classroom sessions.

Regarding Fit for 4.0 output:

- usefulness of the self-assessment test, to rethink one's approach to the different phases of teaching; maybe migrating it to a tool allowing feedback to individual questions could add even more effectiveness;
- sound consistency of the topics covered by the MOOC, covering exhaustively didactic challenges teachers and trainers have to face;
- the micro-MOOCs are a great source of information and inspiration on training methods and approaches;
- the platform usability is OK, not different from others Laura already experienced.

For the future, Laura plans to exploit other methods she learnt through the MOOC when preparing her lessons.



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)



This project
has been funded
with support
from the European
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