ManuLearn Methodology

The EIT – Making Innovation Happen

EIT Manufacturing

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About the project

ManuLearn is a project implemented under the EIT Manufacturing initiative by the consortium of 6 partners: Laboratory for Manufacturing Systems and Automation, University of Patras (Greece); Tecnalia (Spain); Czech Technical University in Prague (Czech Republic); IMH Advanced Centre in Manufacturing (Spain); Engineering industries association of Lithuania LINPRA (Lithuania); Technology centre Intechcentras (Lithuania). ManuLearn program is designed to provide knowledge exchange between academia and industry, aiming to boost innovation capacity in manufacturing sector throughout Europe.

The activity delivers a program where students, researchers and companies work together to mutually develop skills through co-creating solutions to industrial manufacturing challenges. The combined concepts of Teaching Factory (TF) and Learning Factory (LF) with Open Innovation practices, addresses the demands of both – students and professionals.

Each introduced challenge along with the knowledge generated is shared with the complete network, a number of industrial stakeholders (SMEs, mid-caps and LEs), creating value across all participating EIT RIS countries.

The ManuLearn methodology is defined by the Problem-Based Learning (PBL) approach. PBL is a student-centred pedagogy in which students learn about a subject through the experience of solving an open-ended problem. In the case of ManuLearn real industry challenges are key for the experiential learning of participants.

ManuLearn program works following a process of learning through challenge of three stages:

- Understanding and Analysis of industrial needs/challenges;
- Co-creation in Teams;
- and Prototyping and communicating the solution to the companies.

These three stages aim at developing some skills related to knowledge exchange and open innovation and also learning different topics (new technologies and trends in manufacturing sector) relevant for students at different levels and for industry professionals.

This way of learning also considers that companies improve their open innovation skills. While participants from academia provide ideas, and learn about industrial real needs, companies also improve their scientific-technological absorption capabilities and employees are re-skilled with updated technological contents.

The ManuLearn program

The ManuLearn program works following a Learning-through-challenge process. The approach of this program has the following ingredients:

- Learning by doing. Action and reflection learning model. Both action and learning from results obtained come together. Experiential learning in a “safe” context is a very powerful training method.
- Learning with others. Participants from academia and industry will have the opportunity to learn together. Experimenting open innovation processes that will provide processes of develop solutions to professionals and the understanding of real needs that manufacturing companies demand at this present moment.
- Meaningful learning. Participants will work on projects, thesis, challenges/needs connected with the actual and future professional development. New technological trends and processes will be central in the pilots and they will be defined considering the feedback of manufacturing companies.

Depending on the participating actors in the program, the different knowledge exchange models can be: Academia to Industry, Industry to Academia, Industry to Industry, Academia to Academia.

Industry to academia

The Industry-to-classroom educational schema of TF aims to transfer the real manufacturing environment to the classroom through the adoption of an industrial project. In the case of this knowledge exchange model, like in the Academia to Industry model, solving an industrial challenge is also the approach, so participants from academia provide ideas and learn about industrial real needs. In this sense, we can say that Industry to academia is more "Challenge pull" while academia to industry is more "academia research push". The aim of this model is to offer a real ecosystem to participants (from vocational training, master, PhD and lifelong learning) in order to correctly develop the skills that are linked to their curricula. Furthermore, the learning / teaching process would be closer to the industrial reality.

Industry to industry

The approach would be industry participants who meet and learn from each other by creating shared visions on how to approach future manufacturing challenges. The objective in this knowledge exchange model is to learn by sharing knowledge, discussing and co-creating solutions.

Academia to academia

Academia to Academia knowledge exchange model aims at enhancing the no-distance manufacturing learning and knowledge transferring between different universities across the world making use of Learning Factory method. The close collaboration of several academic environments is succeeded through the usage of TF ICT tools.
The academic level learning factory concept consists of reality-conforming production environments at University facilities that are used as learning environments where students can do hands-on experience.

ManuLearn toolbox

Identification of manufacturing challenges

An important aspect in ManuLearn pilots is that real challenges and problems are used as learning arena for participants. The partners' regions share some common challenges related to digitalization of the sector, the introduction of industry 4.0 and re-skilling of workers, among other challenges.
In order to operate in a problem-based-learning approach, it is important to identify specific needs of industrial companies. In this sense, Industry to industry pilot offers some training sessions like "technical webinars" addressing relevant topics for the industry to discuss in an online industry meeting.
The idea is to provide valuable contents to companies and for the ManuLearn partners to detect companies' concerns and transform them into more detailed and specific challenges.
It is important to consider a common method for the identification of manufacturing challenges for educational / training process. When approaching an industry trying to identify relevant needs or challenges, the most important thing is to find the right problems to solve.
It is suggested to use the Request for proposals format (RFP) to formulate the industrial company problem. Request for proposals format looks for approaching the client to identify relevant problems (that he / she has not formulated) and reformulate them from new points of view. It might seem simple, but it requires to ask some questions to the client to discover the real problem behind what he / she is formulating.
So, the RFP must:

- include a description of the need (not the solution that the client seeks),
- look beyond the fields of knowledge and competences of the team,
- be formulated in a simple way.

Guidelines for solving the industrial challenge

The pilots start with a formulation of the problem, as the input that industrial companies provide to the teams.
Here are some guidelines to face this process more successfully, so that the company and participants could have at least three moments / spaces to discuss the problem, present early ideas or concepts and get feedback:
1. Understand the problem
2. Evaluate approaches for the potential solutions
3. Ideate and prioritize
4. Prototype solutions

Supporting ICT tools

A customized Microsoft Teams platform, used for the needs of Teaching Factory facilitates the integration of different and heterogeneous learning objects such as: live streaming videos, audios interactions, presentations etc. into a common learning procedure.
Teaching Factories are performed online, and use the Web to deliver the content. Platform for TF has two front ends both for educators / organizers and learners. The educators have permissions for creating, editing or deleting the TF session and / or the educational material while the learners have access to TF sessions and permissions to create and edit the relative educational material in a user-friendly way. Both educators and learners have access to the tool from all common electronic devices (notebook, tablet, smartphone etc.) in a suitable form.