Planing and implementation of the courses in the EuroMec project

The courses in EuroMec were planned early on to be work-based courses, i.e. courses that were practically orientated and also had a structure that meant that the course followed a natural fabrication process.

The reason for this choice was that the participants in the project had experience of course development that followed a fabrication process. The courses were also to be targeted at the Welding Inspector specialism. This field of expertise and this education can be carried out according to EWF's Guidelines, and it could result in an international diploma that is recognized within the industry in all European countries.

By utilizing the EWF Guidelines for Welding Inspector, the general course content in the form of theory was also determined.

However, it quickly became apparent that EWF's Guidelines and teaching method did not match the desire for work-based learning and that the teaching should follow a fabrication process.

The first practical problem was to reach a consensus on what should be the practical approach for work-based learning, i.e. it meant agreeing on which product categories to focus on in order to achieve a uniform teaching in the participating countries.
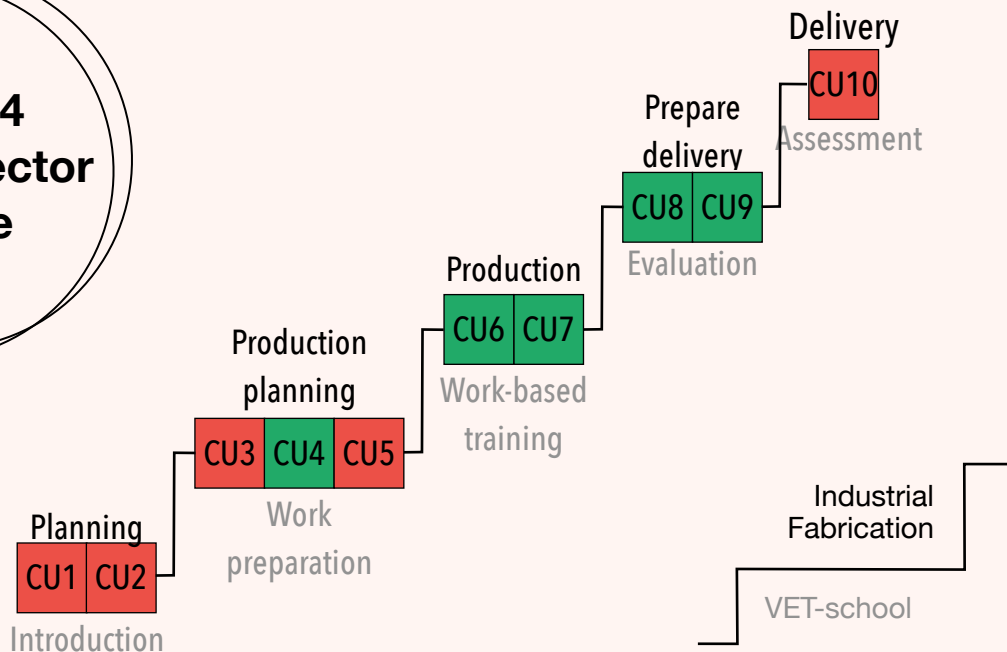
In the EuroMec project, a consensus was reached to focus on pressurized pipelines, pipe connections, with examples from gas pipelines that had the pressure classes defined within PED.

Once the product group to be used in the training had been defined, a natural fabrication process for pipe connections and fabrication methods had to be defined. In addition to this, it was natural to divide the teaching into a number of focussed competence units (CU), each of which could cover specific disciplines/process parts within fabrication.

In order to ensure professional development through the competence units, a target was introduced for the level of competence achieved for each competence unit, in addition to the usual general knowledge requirements and the specialized knowledge requirements. However, when this was incorporated into the course structure, it also meant that the requirements for students' assignments had to be largely orientated towards the achievement of practical results. Again, this led to extensive discussions about how practical competence could be documented by the students.

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ISO 3834 PED Inspector Course

Delivery
CU10
Assessment

Prepare delivery
CU8 CU9
Evaluation

Production
CU6 CU7
Work-based training

Production planning
CU3 CU4 CU5
Work preparation

Planning
CU1 CU2
Introduction

Industrial Fabrication
VET-school

Planing

''It's not what you say, it's what people hear.' The book title from 2007 and renowned author Frank Luntz works in many contexts. The root of many, maybe most misunderstandings. And the reason why you don't talk to your kids the same way as you talk to a colleague or a police officer. Communication is hard - and we fail at it all the time.'

As we began to delve deeper into the practical implementation of the work, we soon realized that the different backgrounds and experience of the various project participants meant that we had to structure the planning work differently from the original plans.

Work-based learning and the introduction of process thinking in the learning process meant that the course content specified in the EWF Guideline had to be further developed and new material had to be added. In addition, products that were relevant to the participants had to be collected, and then these had to be divided into natural production steps so that theory was added to the natural steps in the production process.

In addition, it was natural to include practical tasks to be solved in the same production steps. This in turn caused problems because the participants' industrial backgrounds varied from products with extreme requirements, such as nuclear power and the offshore industry, to ordinary pressure boilers and pressurized equipment.

Each CU was built up with a general structure that was standardized. This structure resulted in a significant simplification for both teachers and students. Learning material was always stored in one place. Assignments for students were also stored in only one place. Similarly, assignment answers were to be stored in only one place. Similarly, multiple choice questions were also only to be stored and answered in one place. All CUs had a short teacher's guide and a short student guide at the beginning when they were opened. This was intended to serve as an introduction to the CU and its content and themes.

Finally, each CU had a short student evaluation of the CU's content and relevance.

Planning for the practical implementation

Once these problems had been solved, the next step towards realization came. In this context, the project participants had decided to use a Learning Management System (LMS) as an information carrier. The reason for this was partly that a number of the potential course participants were in permanent employment and that they also had a considerable traveling distance to the course location where the course could be held. The advantage was that potentially more students could participate in the course, while the disadvantage turned out to be that neither teachers nor potential students for the course had previous experience of using LMS in teaching at this level.

Again, this brought new challenges in terms of understanding how an LMS could be utilized in this type of course and also how a teacher could, and should, communicate with students through the use of an LMS.

Most teachers had experience with traditional classroom teaching where the learning material was presented using Power Point presentations, PPT, and with limited use of video. In this case, most face-to-face sessions would be conducted using ZOOM tools, which was also new to the teachers.

To simplify and structure the use of the LMS tool and also the ZOOM tool, two teacher courses were designed, one for each tool. In addition, the way of using the LMS system was structured so that all teachers would use the LMS in the same way. The reason for this was that the user interface for the students would be the same regardless of which teacher was teaching. At the same time, we achieved the advantage that we could easily change teachers for the different parts of the course without this creating problems. This "roadmap" for both teachers and students meant that the introduction of the LMS gradually became much easier for all parties.

In the planning phase, it was also intended to use a calendar as a user interface to access the individual CUs that made up the course. This was not implemented for the first pilot courses because we realized that there would be too many new features to absorb in a short time.

Teaching materials

The course was developed in co-operation between the countries involved in the project. For practical reasons, it was decided that the teaching material would be delivered in English. However, we were soon asked if we could also deliver the course with learning material in national languages. The solution to this was to develop a reference course with all material in English. This course was then copied to the various participating nations, where they could change or add material in their own language.

The advantage of this solution was that the reference course could have a comprehensive learning material and that it was quick to define the course material without this being too costly. Similarly, much of the material could be downloaded from the Internet for free use or to be edited and customized for the course. Particularly with regard to the use of video, it turned out that the selection of relevant material was much better if English text or speech could be used.

Practical implementation

The practical implementation started with a face-to-face meeting with teachers and students. In addition, all teachers and students were given access to the LMS with all CUs and all learning materials.

The course was conducted in the period 19 October 2022 to 19 January 2023, i.e. over a 3-month period. All students were active in the LMS system during this period and the assignments were answered through the LMS system.

Face-to-face sessions were divided into 45-minute blocks with a 15-minute break between blocks. At the end of each session there was an open forum for discussion with the teacher.

Through the LMS system's statistics module, we were able to monitor the students' progress in terms of the frequency of logging into the LMS and the duration of each login. It quickly became apparent that the main emphasis on logging in was concentrated on certain days, especially Friday and Saturday. Login time also varied greatly. This was expected given that most of the students were in permanent employment.

However, what surprised the course instructors was that the students continued to use the LMS system long after the course had ended. No investigation was carried out into why this happened, but what could be seen was that a significant number logged into the course and worked with it after the course ended.

Completion of the course

Throughout the course, students were given practical assignments to complete. The assignments were submitted through the LMS system. The assignments were written, in the form of pictures and drawings with comments, and video was also used for the assignments.

The quality of the assignments was not assessed in the LMS system as the course was organized at this stage. In subsequent courses, it will be natural to include a qualitative assessment of the submissions.

Evaluation of the course

As previously mentioned, there was a short feedback from the students at each CU. This feedback provided an overview of whether the content of the CU was relevant in relation to the students' expectations and their own work experience.

At the end of the course, a survey was conducted where the students were asked to answer a number of questions, in this case 14. The best assessment gave a grade 1 and the worst assessment gave a grade 5. The course assessment gave a total grade of 1. The content of the individual CUs gave a grade of 1.1.

What was the best thing about the course: The practical approach to the problem areas.

What was the main problem with the course: There is a desire for the learning material to be in the national language.

From the project's point of view, the main problem with this type of course can be categorized into the following main areas:

1. The courses must be structured with a practical approach, i.e. access to practical data from industrial companies must be available so that students can recognize the examples and the tasks they have to solve.
2. Teachers with sufficient experience and expertise from industry must be available so that they can draw on their industrial experience in their teaching.
3. Practical assignments must be prepared for the students in the various CUs. Theory and practice must go hand-in-hand here.
4. Students must be able to draw on examples from their own companies.
5. Practical day-to-day solutions for the companies that the students represent must be encouraged.
6. If students do not have practical experience, they must be put together in groups with students who do have practical experience. In this way, students can contribute to their own development and knowledge dissemination.