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GUIDELINE FOR THE TRAINING OF TRAINERS IN WELDING

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Abstract

New Guideline for the Training of the personnel who provide training in welding field is proposed in the paper. The conception of the guideline is based on a set of seven Competence Units and on a set of required Learning Outcomes that are able to build the named competences. To achieve the learning outcomes specific Curriculum is proposed. The elements of the proposed curriculum give the trainers the possibility to apply specific pedagogical approaches and methodologies, as the workshop model, to their training and teaching activities. Such model is a general framework that describes the main working lines of an effective workshop and it is built to support trainers in motivating trainees to take charge of their own learning, becoming active and engaged in their work. By these, a maximization of the use of digital tools and environments currently available that promote a competence-oriented education, thus fostering the development of basic skills and key competences that will make the difference for their learners' success when it comes to the real performance at a job.

The proposed curriculum allows education leaders and teaching staff to deliver technical training in an improved manner, which means the use of specific alternative pedagogical approaches and embedding key competences' development in technical subjects' training.

Keywords: Welding and STEM, Teacher, Trainer, Guideline for training, Curriculum, Workshop model, Learning Outcomes

1 Introduction

The manufacturing systems, equipment and technologies contained in them, are experiencing a continuous and accelerated development. The operation of these systems is done by specialists with various levels of education and training. An imbalance between the speed of development of manufacturing systems and the skills of the specialists who operate them can cause, on the one hand, a malfunction of the systems and, on the other hand, a reduction in product quality. The incorrect functioning of the systems is manifested by discontinuities of the manufacturing process (caused by temporary decommissioning of the equipment involved, injuries to the operating staff, errors in coordination, etc.) with direct effects on system productivity. All this attaches great importance to updating workers' skills. These competency updates need to be provided on an ongoing basis, but this would not be

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possible if teachers or lecturers updating their knowledge and skills were not, in turn, very well prepared.
The European Welding Federation (EWF) and its member organizations have developed an international harmonised system for education, training and qualification in the field of welding technology. It is the first harmonized system embracing all the European countries for the qualification of personnel for a wide range of levels both in welding, related technologies and inspection. EWF provides training guidelines that cover all professional levels in welding technology and related areas, such as Thermal Spraying, Adhesive Bonding, Plastics Welding and Underwater Welding in 45 countries worldwide. The importance of this system is recognised by ISO and CEN.
An efficient implementation of this system is strictly related to the quality of the teaching/training staff, and projects are continuously proposed to meet all the requirements related to that. The development of the competences of education leaders and teaching/training staff is the main aim of WELDONE project. WELDONE has an approach based on a necessary change in the mentality of teachers and instructors, in the sense of using a way of teaching in which active learning, based on direct experiences and projects, have main roles. While teachers now provide students with answers to their problems, the new approach asks teachers to help their students to apply own research and identify the right questions and find the best answers. In order for their trainees and students to develop an entrepreneurial attitude, teachers need a wide range of skills related to creativity and entrepreneurship; they need to create a learning environment in which creativity and risk-taking are encouraged and mistakes are valued as a learning opportunity. Such an educator is needed by a system like the one developed by the EWF. They need to be flexible in carrying out and implementing various pedagogical strategies. They must also prove their adaptability to the most diverse themes / contents, and last but not least they must be able to make the most of all the digital tools and media available today that are to the liking of young people participating in training.

2 Building the Guideline

A guideline for the training of trainers is a complex system, starting from a necessity, bringing distinct solutions and setting an assessment mechanism to prove that the adopted and implemented solution creates specific capabilities to a trainer who acted as a trainee in order to improve its own quality as trainer.
Nowadays, the technologies used as teaching and learning tools differ greatly from the technologies that existed a decade ago. People who want to be trained are significantly different from people who were trained a decade ago.
If a young person becomes a teacher / instructor, the approach to new teaching tools, based mainly on digital technologies of the moment, will be an easy one. The success of such an approach is guaranteed, because the young man grew up with the evolution of these tools, intersecting almost continuously with them.
However, if a person who has been working as a teacher / instructor for at least 15-20 years aims to approach these tools, their adoption for the teaching activity will be significantly more difficult.
In parallel with this problem, other problems are identified. A young newcomer to the teachers' guild is more open to alternative teaching techniques and is more creative

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in their approach. It will be almost impossible for an ordinary teacher / instructor to transmit certain information in a certain way to accept the transfer of information by another method, being convinced that in many years of activity he has certainly found the optimal option in which information can be transferred.
And many such differences can be identified between the newer and older generations of teachers. It does not mean that classical approaches are incorrect, inefficient or outdated. It just means that a younger teacher is closer to the way of teaching that the students / students to whom he transfers the technical information want. He comes from that generation or the immediately preceding generation. He knows their needs, he knows their style, he can address them through a language that they understand and he manages to transfer a larger volume of information to students.
A teacher / instructor training guide should start from the student's / trainee's receiving status.
In order to be "heard" by its students, a teacher must have a minimum of skills to operate with all the technologies and techniques at his disposal. These skills or competencies are developed through specific training. The content of the information they must receive, theoretical or practical or attitude, results from a careful analysis of the "mismatches" between the technologies and techniques accepted by students and the teacher's ability to understand, control and apply them in the teaching process.
Such an approach has led the team implementing the WELDONE project to identify a set of 7 units of competencies that any teacher should have developed:
Competence Unit 1 | Multiple Intelligences and Learning Styles
Competence Unit 2 | Learner Centered Didactics: Problem Based Learning, Critical Thinking
Competence Unit 3 | Gamification
Competence Unit 4 | Digital Competence and using digital resources
Competence Unit 5 | New Media Didactics: The use of social media, micro-learning
Competence Unit 6 | Personal, social and learning competence
Competence Unit 7 | Entrepreneurship competence
Is that enough? There are too many?
It is difficult to comment on these questions at first glance. Before being adopted as guidelines for the training of a teacher / instructor, the usefulness of these units of competence should be verified through successive short courses. The most coherent approach that could be considered here was the implementation of courses built on the typical of a workshop. This model is a “step by step” method with a given time frame, which is usually tight. This requires a good preparation, which is key to achieve good results in this model.
Learning outcomes broken down by sessions clearly explain, with active verbs, what trainees will be able to do, know and feel by the end of the session:
Step one: Opening - The opening part has several important roles - breaking the ice, raising enthusiasm and focusing on the key learnings. In the opening session, the trainer clearly sets the objectives of the whole session: what trainees should be able to know or do by the end of the session. The trainer may explain the schedule and the rules of the session and can throw in several opening tricks such as ice brakers, warm-ups, that energise trainees. The trainer should be expert at assigning tasks to the group. If trainees understand the reasons behind what they are asked to do, they will have a new sense of motivation.

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Step two: Mini lesson - Mini lessons are short instructional or demonstrational periods during which trainers can explain and model a strategy that they want learners to immediately apply or use. Mini lessons should last about 10 minutes and include discussion between learners. Trainers must be able to explicitly model their material and provide learners the opportunity to discuss how they can apply it before they go with it into the work session. They are well tailored materials that describe an activity or a process; or illustrate a model.
Step three: Work Time - Work time is the active part of the workshop where trainees learn by doing. In work time, trainees work while trainers actively watch, listen and take notes that could be used as feedback in the reflection (debriefing) phase. Sometimes trainers can work with one or two trainees while the others work. The right method depends on various factors.
Step four: Debriefing - Debriefings may vary depending on the topic or on the group. However, there are common rules of debriefing. The most important rule is objectivity.
With such an approach in mind, for each competence unit were defined the topics of discussion (ie precisely the curriculum of the learning unit), the estimated learning outcomes, the number of effective contact hours (not only teaching, but also interviewing, analysis). etc.), as well as an estimate of the time it would take students to reach the estimated learning outcomes.
Speaking about the learning outcomes, both the theoretical knowledge and the practical skills of a teacher, as a student, are taken into account here.
A section of the guide has therefore been set up which provides information on possible pedagogical approaches and verification tools, all of which are seen in the light of the purpose of the learning activity.
In this section, each unit of competence must answer the following questions:
- what issues does it address?
- why is it important for the future activity of the teacher / instructor?
- what is its relationship with each of the key competences institutionally defined at EU level?
- what are its relations with each of the other units of competence?
- What are its favourite pedagogical approaches?
- What are its favourite teaching tools?
The last section of the guidelines is related to the assessment which should be applied by a teacher after each training session, or after a group of training sessions.
Evaluation is important for the teaching-learning process. It helps teachers/trainers and learners to improve teaching and learning. In the assessment process, first step is to determine what to assess, i.e., to set down educational objectives.
Trainers/teachers need to identify and state the objectives and while doing so focus their attention on the final "product". Specific objectives determine the method to be employed to evaluate the learning experiences.
Assessment can be classified into different categories in many ways. Depending on its purpose, we differentiate between the diagnostic, formative and summative assessment:

- Diagnostic Assessment - It is conducted in order to establish the quality and level of learner's previous knowledge and skills, i.e. before the teaching process. Based on the collected information, the teacher/trainer adjusts and plans the teaching process.

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- Formative Assessment - It is conducted during the teaching-learning process and is an inseparable part of it. Formative assessment is developmental in nature. The aim of this evaluation is to improve learner's learning and teacher's/trainers' teaching.
- Summative Assessment - Summative evaluation is used after the course completion to assign the grades. Its purpose is to evaluate learners' achievement.

3 Conclusions

Building a guideline is a long and process complex, because involves large number of factors to analyse and synergically combine.
Project WELDONE organised international analysis of the requirements related to a training of trainers' process, taking account of the national specificities and taking account of the information to be taught, as well.
The built guideline uses as inputs the factors that are influencing to relation teacher – student. Those factors were grouped in distinct competence units. The development of the defined competences, it was set the curriculum for the training session, the number of contact hours, the time necessary for the students to develop the competences during and after the training session. The last section of the guideline was dedicated to the assessment session, which was mandatory to be built according to the structure of the training session for each competence unit.
The improvement of all these sections of the guideline was done by using workshop model for each session of training.

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