

ACTIVITY BASED TRAINING WITHIN PLASTIC WELDING` A NEW TRAINING APPROACH

Abstract

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Globalization of industrial production processes requires harmonization within education of personnel both in the industry sector as well as in the VET schools, thus promoting free movement of personnel between different fabrications sites in Europe. Of particular interest is certification based training following the production schedule and industrial process.

Training within mechanical industry and in particular the welding community is still frequently often carried out with traditional means, i.e. classroom based training with blackboard equipment, overhead, flip-over and PC's as the general tools. The design of learning services must change from content based to activity based learning systems. Activity Based Training (ABT) closely follows the industrial production- and fabrication processes. Competence is defined as "the ability to meet demands or carry out a task successfully, and consists of cognitive and non-cognitive dimensions".

The purpose of this paper is to give an overview of the ongoing developments of new pedagogical methodologies that utilize a blended learning framework by mixing ABT with state of the art solutions for inclusion of video and other digital tools in order to offer improved transfer of knowledge within the industry. A production process oriented fabrication chain approach with job orders and job packages constitute the fundamental building blocks within the new training paradigm.

1. INTRODUCTION

Times have changed dramatically in a few short years. Our economy is based more on services than farming or manufacturing. Therefore, jobs today require more intellectual strength (brains) than physical strength (brawn). With this migration away from farming and manufacturing and toward services and information based production, workers need intellectual skills.

Our globalized economy has rid many nations and companies of competitive advantages. Most companies have access to the same tools, raw materials and markets as their competitors. One of the few remaining advantages that businesses retain is their ability to squeeze more out of the inputs by applying another input-information or knowledge-in a more cost-effective, productive way.

Unique applications of intellectual capital can improve the output from the commodities (labor, capital, raw materials) that are accessible to competitors. Therefore:

- Knowledge and information are the source for the new competitive advantages.
- There is a need for perpetual education in order to sustain and improve the intellectual capital.
- The education system must be more cost-efficient and effective.

The changes we are seeing in society are converging at lightning speed with advancements in technology. One of the most powerful technological advancements that has hit the scene in recent history is the Internet, which in a few short years has become the platform for information, communication, and commerce.

The term e-learning is commonly used to describe courses in which nearly all the interaction between the teacher and student takes place electronically. Electronic communication may take the form of audio, video, e-mail, chat, teleconferencing, and, increasingly, the Internet.

Distance education courses range from short-term training workshops to undergraduate and graduate programs for college credit.

2. QUALITY ON E-LEARNING

Since the life cycle of skills is getting shorter, professional training holds a very important role in the development of Society, namely in its professional and social areas.

In the present moment, the great challenge in the e-learning is undoubtedly the finding of solutions which, on the one hand, stir up the interactivity of the user and the training system and the process of training itself and, on the other, help to overcome the learning process in one's own.

In these systems, it becomes vital to monitorize the entire management process because; more than enhancing a continuous improvement, the monitoring tools provide the basic information for something that is being largely discussed – the efficacy of the e-learning. Many companies do not invest in the e-learning since the lack of tools for measuring the results makes the perception of the advantages versus the costs difficult.

Monitoring the quality is essential in any training management system which aims to ensure both the requisite efficacy, from the first phase of the diagnostic of the need, and the necessity of measuring such efficacy.

3. TARGET IDENTIFICATION AND NEEDS ASSESSMENT

A needs assessment is a process whereby data is gathered to establish whether training is required and what type of training.

In plastic welding a project is being developed based on needs in a target sector involving effective competence transfer and skills follow up through on-the-job training between specialized and innovative mechanical industry SME's that need to certify their personnel.

The sector consists of innovative SME's in Europe dealing with fabrication of plastic pipes and structures of plastic pipes. These SME's are expected to develop a wide range of new products spanning from simple products into a range of high technology products that will emerge through the innovation process.

The first target application for the new training procedures is to train welders for the gas distribution pipelines related both to central gas distribution between distribution hubs and supplying canterers as well as gas distribution to the customer. This will cover a wide range of piping products both related to the piping diameter as well as wall thicknesses and as well as the transport pressure itself. The other target area is waste removal and management of contaminated water where especially in the new 10 European countries the distribution infrastructure must be renewed and enhanced due to lack of existence or maintenance.

The definition of training goals, defining the final user's profile; his daily availability for attending the course; the dysfunctions in the work place and his consequent needs of training so it is possible to define the specifications in the instructional design, was done.

The target groups are SME training personnel (e.g. in-company, external training companies, and organizations engaged into the apprenticeship system), and trainees who with variable frequency, train other categories of staff during various types of short courses.

To define the training it is needed to describe what learners will be able to do after the training program. In the present case the goal is for the trainees to acquire skills to be welders in the plastic industry, qualified by EWF, and to get certification as plastic welders, in accordance with EN 13067.

Is important to gather information regarding how much learners already know about the topic being presented.

Accesses conditions are defined and are checked on a one by one basis for each trainee. The fulfilment of the access conditions leads to a degree of harmonisation regarding acquired skills before the training course.

When these aspects are well defined the percentage of abandonment and failure in the courses decrease and this creates a requisites based that facilitates to evaluate the program.

4. INSTRUCTIONAL DESIGN

The design of an e-learning program is dependent on the purpose of the training. Like conventional classroom training, a range of exercises, assignments and roles are used to achieve specific goals.

Designing e-learning programs involves the definition of rules according to the standard requisites in order to develop the scripts coherently and the methodology to be adopted in relation to the aimed public.

The European Welding Federation EWF, a network of 26 European countries with members that are leaders in Joining Technology, has developed a harmonised scheme for the comprehensive education and training of plastic welders which follows the procedures set down for approval testing of welders, thermoplastic welded assemblies, in EN 13067. This guideline provides a combination of high skill and the necessary theoretical background, leading to EN 13067 approval tests. Welders successfully completing specific modules or combination of modules, achieve the relevant EN 13067 approvals.

The guideline covers the range of plastic welding processes and materials covered within EN 13067 as well as a few processes and materials not covered within the standard. A modular format has been designed to accommodate a 'mix and match' approach to suit the variety of needs within the plastic industry.

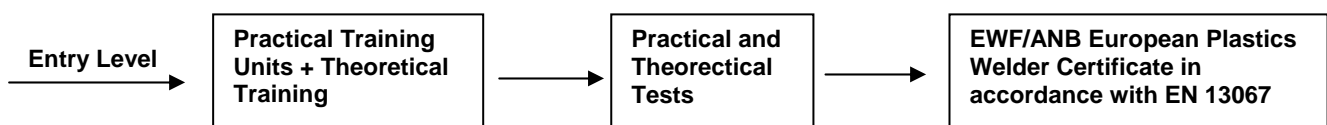


Fig. 1: General Representation of the Structure of the EWF system.

Instructional designers must consider many factors as they are creating the lessons. The easiest factors to evaluate and plan are practical considerations such as need to repurpose existing course materials, the limitation imposed by financial considerations and the boundaries created by the technical infrastructure. The more challenging factors to consider are the learning outcomes, roles of the trainers and trainees and types of interactions available.

The e-learning course for plastic welders, developed in the Hamster – Project, supported by the Leonardo da Vinci program focus as the modules of Hot Gas Welding and Electro Fusion Welding and has developed a program for “train-the-trainer” that will train people for delivering Visual Communication and Collaboration (VCC) adapted training using a mixed Blended Learning and Training (BLT) environment that enhance the quality and cost-effectiveness of the training process, e.g. by using high quality (streaming) video instructional presentations of processes and techniques that goes beyond current practices in the sector.



Fig. 2:
Video streaming on a Smart board.
Teacher makes digital notes.
Notes are afterwards published on the Internet.

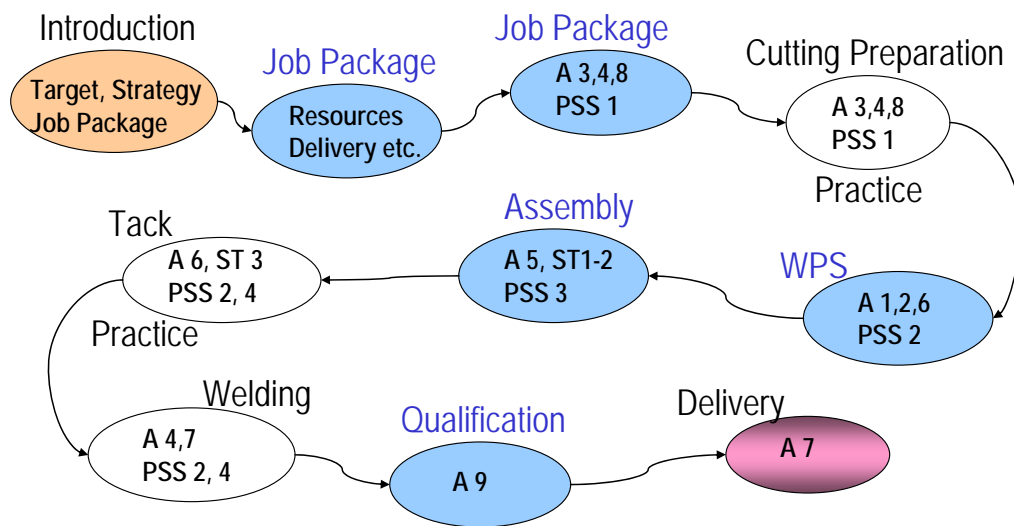


Fig. 3: Activity Structured Training (AST) that follows the Production Schedule.
Theory is grouped together in the (blue) colored boxes, while the white boxes illustrate the practical skills development within the production workflow. Coordinated use of VVC and blended learning will be used in the colored boxes

The project aims to establish and validate new training and support principles (i.e. AST – Activity Structured Training, based on production workflow) within SME mechanical industry by using the plastic welding community. It will deliver training and training content in a new way that promote mixing of high quality video adapted learning environments with just-in-time on-the-job training/mentoring, as an efficient tool between workers and trainers during their ongoing production processes.

5. Development of the Contents

These should be set accordingly to the standards of the e-learning so they can function in every certified platform. It's vital to check up the pedagogical, graphical, orthographical and technical levels and also to find out if the product in the computer is in accordance with the script specifications which were defined in the instructional design. In the case of self-study, the content holds a very important part by stimulating and capturing the information as far as the trainee is concerned.

6. Conclusions

The work being carried out for the development of an activity based training course for welders working in SMEs responsible for assembly of plastic constructions involving welding is aligned with the principles of e-learning methodologies and uses advanced innovative teaching techniques that will facilitate acquisition of know-how by the trainees.

The main results will be:

- Validation of Activity Based Training (ABT) methodologies for welder-trainers and welders, offering a new training framework by inclusion of state of the art VCC and modern ICT tools, for distribution and cascading of SME company specific know-how into other SME or VET schools
- ABT follows the industrial production processes, utilizing work orders and work packages and may be utilized in Skills Upgrading Processes where theory and practice are closely connected
- ABT may be utilized as a blended learning framework: face-to-face, on-site training, e-learning solutions, high quality video streaming, and video conferencing
- Train-the-Trainer courses target deployment and use of video- and Smart board technologies in training - new pedagogical methodologies and visual communication and collaboration services
- A new harmonized SME skills transfer model based on the harmonized curriculum guidelines of EWF; welding courses are structured according to the European Welding Federation's Guideline EWF-581-01 leading to certification accordingly with EN 13067.

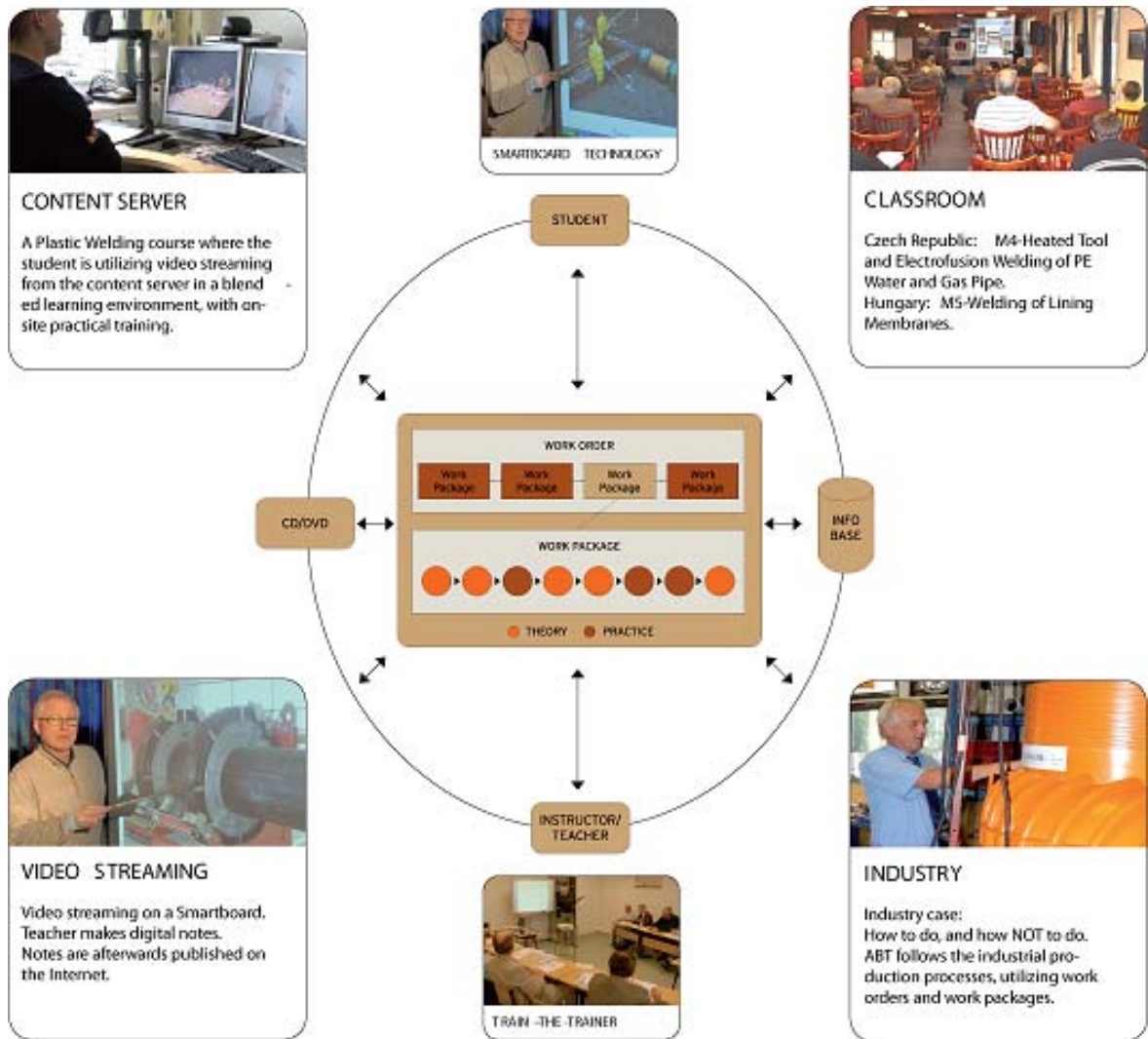


Fig. 4: Structure of the course for plastic welders (Hamster Project)