Internationalisation and Multilingualism as New Trends in Vocational Education and Training: A Sample Case in the Balkan Countries

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Abstract

As it is widely accepted among the scholars and educational policy makers, multilingualism and internationalism are two key visions integrated and completing each other. The aim of this paper is to present a virtual environment developed as virtual training centre in English, Turkish, Greek and Romanian. Since the consortium consists of educational organisations in the Balkan countries, it can be regarded as an example of partnership and cooperation among the Balkan countries. The Virtual Training centre for CNC was developed to promote and reinforce Vocational Training in Computer Numerical Control (CNC) Machines. "Virtual Training Centre for CNC", as a multilateral LdV Project product, has high importance in terms of virtual teaching and learning in vocational education and training. This virtual training environment is based on a common curriculum developed by the project partners in the Balkan countries. The Virtual Training Centre (VTC) was set up on the Internet for Computer Numerical Control (CNC) training based on virtual aids. A virtual space (a CNC training portal) on the Internet which allows the constant sharing of e-learning-based CNC teaching material was created so as to foster the further development of e-learning based CNC educational contents. The VTC for CNC is an interactive platform, a meeting point for policy-makers, social-partners, practitioners, researchers and all those with an interest in CNC field of vocational education and training.

Keywords: Virtual Training, CNC, Virtual Environment

INTRODUCTION

Internationalization, in terms of education, is the process of planning and implementing educational products and services in such a way as to be easily adapted to specific local languages and cultures. It means the transformation and translation of these products into the target languages and cultures. It seems impossible to carry out such a task without forming cooperation at international level. Considering that the products are educational, the cooperating organisations should be related with education and training. In this context, a large number of vocational training centres and technical universities are giving priority to Computer Numerical Control (CNC) Training, especially in the last decades. New developments on CNC machines are providing a continuous need for updated CNC training curriculum. Training on CNC should follow similar developments and in particular in their programming capabilities, automation they offer and their technical capabilities. In addition, CNC programming is becoming more and more automated through the use of CAD/CAM systems. This requires from the programmers to acquire CAD operation capabilities, on top of their CNC operation and programming knowledge. The major objective in the field of CNC training is to improve the qualifications and competences of the trainees, which is directly related to a well-designed and effective curriculum to be carried out on CNCs.

Computer Numerical Control refers to the use of a computer to control and monitor the movement of a machine. The machine could be a milling machine, lathe, router, welder, grinder, laser or waterjet cutter, sheet metal stamping machine, robot or many other types of machines. A CNC training course should consist of the tuition of CNC programming methods and their application on actual conditions of processes. Its main task should be to make any trainee at any training level capable of handling and programming CNC machine tools. CNC training usually takes place under supervisory attendance that emphasizes the technological character of the training object. Additional

support of appropriate teaching material such as media and methods (slide-shows, movies, multimedia, demonstration of manufactured pieces, visits to machine shops is often used. Furthermore laboratory exercises are necessary for the understanding of each topic of the subject, some taking place under actual conditions and other on paper. This way, the trainee can easier understand the CNC machine programming, its applications and he can face the technical problems encountered during the manufacturing of the parts. A large amount of programming exercises can help the trainee to understand the theory in a better way, offering him the sense of the quantity of the skills that has to obtain and the difficulties that he is going to encounter, according to the machined part geometry. To accomplish all these objectives, the exercises included in the curriculum, should include data from real working conditions, as much as possible.

THE COOPERATION AT THE BALKAN LEVEL

The partner educational organisations that worked in order to develop the Virtual Training Centre (VTC) comprise three universities from three Balkan countries:

- Turkey: Technical Science College, Selcuk University, Konya
- Greece: Technical University of Crete, Chania
- Romania: "Gheorghe Asachi" Technical University of Iasi

The content and the virtual environment were developed in English at the first stage. Then, the partner organisations translated and transformed the content into Turkish, Greek and Romanian. Thus, the training centre was developed as a multilingual educational product.

AIMS OF THE VIRTUAL TRAINING CENTRE

The virtual training centre aimed to improve the skills and competences of people to promote and reinforce the contribution of vocational training to the process of innovation, with a view to improving competitiveness and entrepreneurship, also in view of new employment possibilities.
The specific aims of VTC can be defined as follows:

- Training the trainers, trainees, technicians and apprentices and all enthusiastic about CNC.
- Preparing technicians as intermediates having common measurable qualities the industry is seeking.
- Helping to form a labour force that can use current knowledge and technology, and thus, in search for life-long learning.
- Supporting the sectoral communication through the national centres in partners.
- Setting up a website to publish the data collected.
- Adapting the collected materials to enhance the new curriculum satisfying the requirements in a modern sense.
- Helping to improve and upgrade competences and skills of the involving institutions' didactic staff and exchange experiences over the virtual training centre.
- Enabling the participants to extend the common educational qualifications of CNC technologies, the accreditation of the skills and knowledge of CNC technologies acquired within the network created between participating institutions and organizations.
- Increase the quality of employment through qualified workers.
- Helping to increase active use of technology acquired and thus to increase the standards.
- Contributing to individuals by behaving through life long learning.
- Having a labour power in accordance with common design and production standards.
- Contributing to labour market by using the common technology and equipment effectively.
- Helping to enhance available potential of human sources.

TARGET GROUPS OF THE VIRTUAL TRAINING CENTRE

Target groups will be trainers, trainees, technicians, apprentices and all enthusiasts about CNC. The final and potential users of the project's results will be the training organisations, the SMEs dealing with metal products by CNC usage, and the universities, colleges, vocational schools, training

centres. The feedback of the implementation of the VTC in training centres will be recorded and the training participants will evaluate the curriculum; this will be undoubtedly one of the strengths and recommendations on both form and content, which will be incorporated into the final version. Evaluation will cover content (topics, language used, modules), methods (progress, different levels of difficulty, and range of resources, situations and practical cases) and technology (ease of installation, interactive nature and use without a tutor). Testing of the resource in self-instruction, workplace and training centre situations will be important. The experiences and knowledge gained during the implementation of this Centre can be used in developing and improving other training programmes in particular in the area of new information technology applications in related sectors.

THE COMMON CNC CURRICULUM

Each European Country has a different curriculum in CNC training. During the first stages of the project, the equipment, methods, curriculum and techniques currently used for CNC training by the organisations in the partner countries were observed, collected and evaluated (Şahin et al.: 2007, Xiaoling, W.; 2004). The selected materials were used to create a new and common curriculum. Five important factors that contribute to learning were taken into account in order to prepare the common CNC curriculum:

- Motivation
- Aptitude
- Presentation
- Repetition
- Practice with reinforcement

The approach for developing the appropriate training material was based on the following key concepts:

- Know your machine (from a programmer's viewpoint)
- Prepare to write programs
- Understand the motion types
- Know the compensation types
- Format your programs in a safe, convenient, and efficient manner
- Know the special features of programming
- Know your machine (from an operator's viewpoint)
- Understand the three modes of operation
- Know the procedures related to operation
- You must be able to verify programs safely

This approach combined with the important learning factors finally led to a CNC training curriculum including 28 sessions:
(1) Machine configuration; (2) Speeds and feeds; (3) Visualizing program execution; (4) Understanding program zero; (5) Measuring program zero; (6) Assigning program zero; (7) Flow of program processing; (8) Introduction to programming words; (9) Preparation for programming; (10) Types of motion; (11) Introduction to compensation; (12) Dimensional (wear) tool offsets; (13) Geometry offsets; (14) Tool nose radius compensation; (15) Program formatting; (16) The four kinds of program format; (17) Simple canned cycles; (18) Rough turning and boring multiple repetitive cycle; (19) More multiple repetitive cycles; (20) Threading multiple repetitive cycle; (21) Subprogramming techniques; (22) Control model differences; (23) Other special features of programming; (24) Control model differences; (25) Machine panel functions; (26) Three modes of operation; (27) The key operation procedures; (28) Verifying new programs safely

VIRTUAL TRAINING CENTRE FOR CNC (http://www.vtcforcnc.com.)

The virtual environment developed for CNC training is a web based portal which is accessible by membership. The virtual environment first was developed in English together with the whole content. Then, the developed content was transferred to the virtual environment from English to

Turkish, Greek and Romanian. When the trainer or trainee clicks on the small flags indicating the native language, it is possible to see and follow the whole content in that language. Glossary section explains the terminology used in CNC training. In Evaluation section, there is a database for trainers to form their own exercise to apply in the workshop. The virtual environment has many simulations and pictures in order to train the trainees with the help of virtual aids. The main aim of the VTC for CNC aims is to be an interactive platform, a meeting point for policy-makers, social-partners, practitioners, researchers and all those with an interest in CNC field of vocational education and training. Experts in the field are able to share and exchange knowledge and experience with associates within and outside the European Union. This will foster the long-term viability of the Centre.
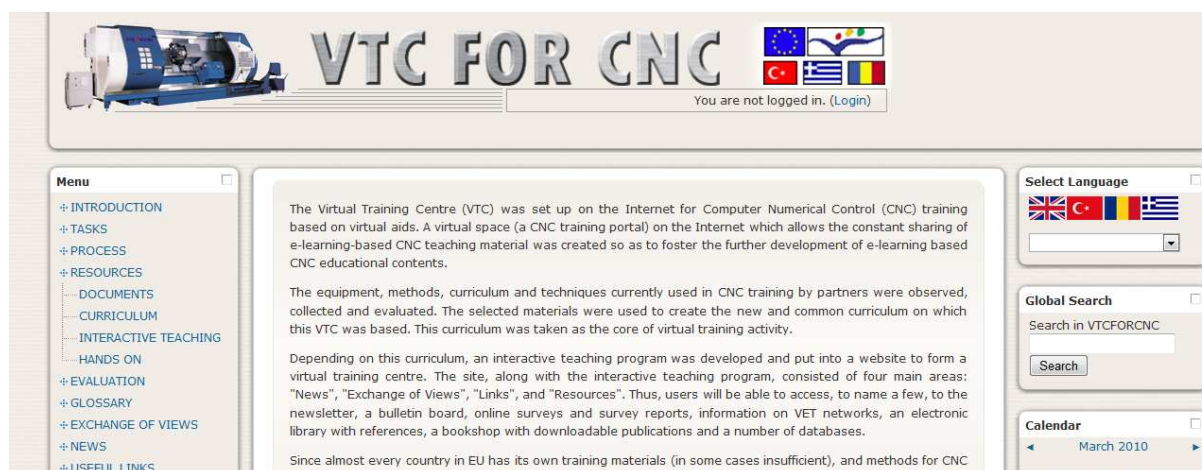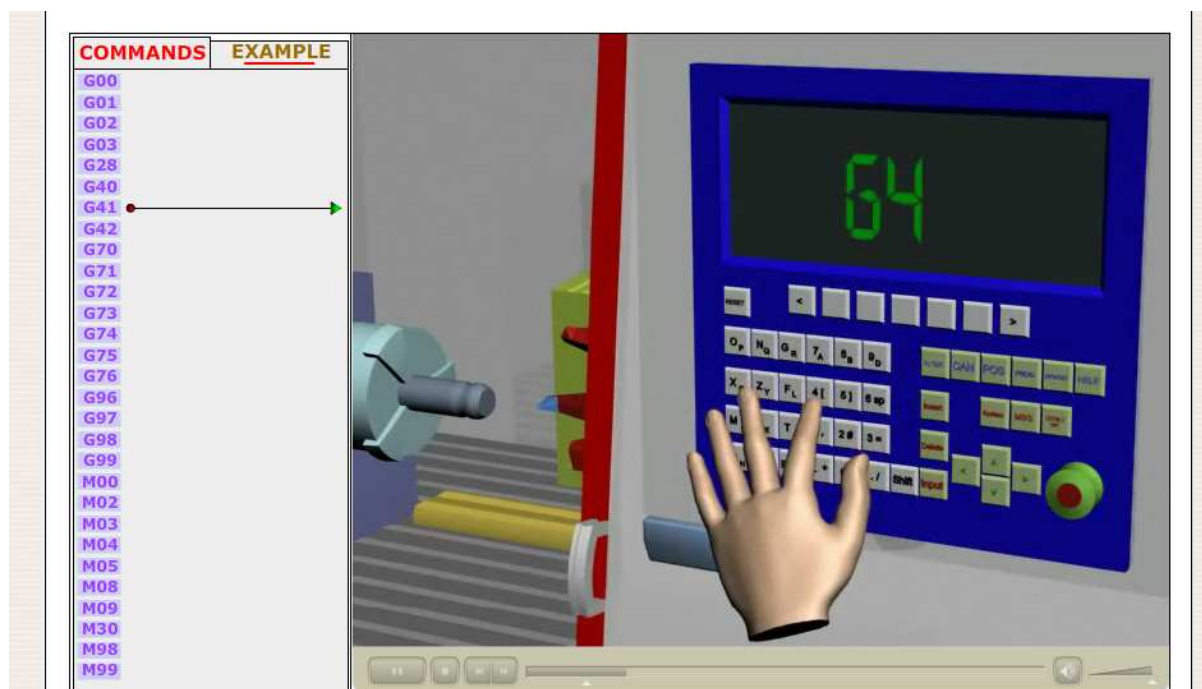

Figure 1. Interface for http://www.vtcforcnc.com.

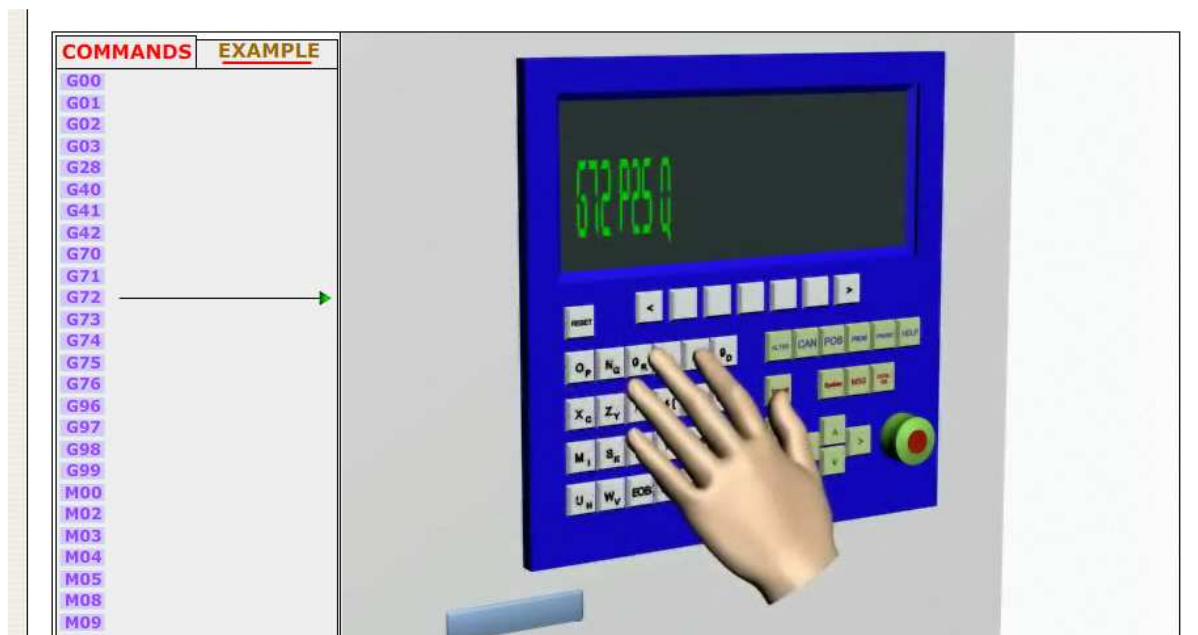**Figure 2.** An animation for Command G41
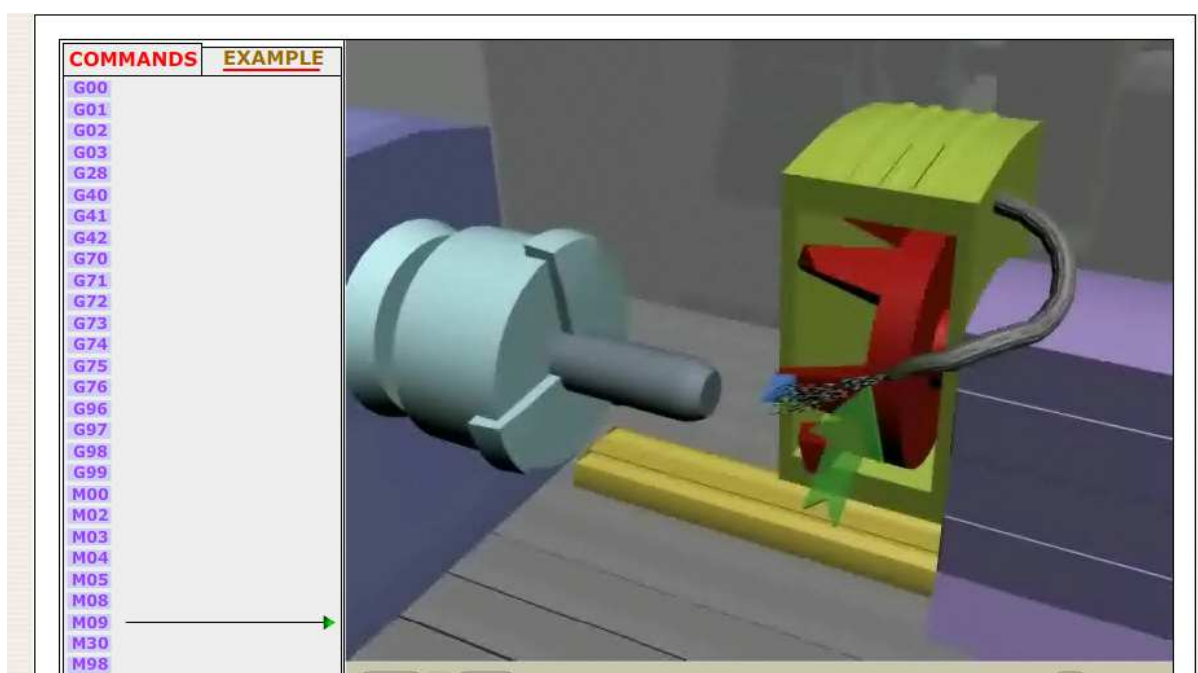
Figure 3. An animation for Command G72

Figure 4. An animation for Command M09

CONCLUSION

At the national level, integration of ICT has been a key priority with national and regional institutions making a commitment to ITC and the development of networks. Furthermore, major national objectives include an increased national flexibility with a commitment to support common standards of quality and assessment and to develop national and international metadata standards. The Virtual Training Centre addresses the strategic objectives mentioned above: improving the quality and effectiveness of education and training systems in the EU by developing skills for the knowledge society, ensuring access to ICT for everyone, increasing recruitment to scientific and technical studies, and making the best use of resources. Facilitating the access of all to education and training systems by providing open learning environment, making learning more attractive, and supporting active citizenship, equal opportunities and social cohesion is the other strategic objective that can be

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achieved through this virtual training centre. The experiences and knowledge gained during the implementation of this Centre can be used in developing and improving other training programmes in particular in the area of new information technology applications in related sectors.

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