RESEARCH PAPERS
FACULTY OF MATERIALS SCIENCE AND TECHNOLOGY IN TRNAVA
SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA

2014 Volume 22, Number 34

DYNAMIC EDUCATION AS A MODERN EDUCATION SYSTEM OF UNIVERSITY

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Abstract

The contribution discusses the issue of modern education system of university. This method of education was designed within the KEGA project. Implementation of on-line classroom for dynamic education of the secondary technical school and university students focused on the design and manufacturing of freeform surfaces. The main objective of this teaching method of is improving the parent faculty cooperation with training centres and increasing the interest of secondary school students in the university studies of technical orientation.

Key words

dynamic education, on –line classroom, CAD/CAM, machining

INTRODUCTION

As modern methods of education, on-line presentation or e-learning are indispensable in current training techniques not only in courses in companies, but they become a part of the education process in the secondary schools and universities (1). Mainly owing to the new way of communication which is provided via a network which provides interaction and learning support, give new impetus to education. It brings many benefits especially to the distant learning methods of education, but for the full-time form, too. In our case, we decided to design an online classroom in the STU MTF in Trnava, which should lead to better cooperation between training centres in Dubnica nad Váhom and Komárno with the parent faculty and increase the interest of the secondary school students in the university studies of studying on the college with technical orientation. Online classroom, with software and hardware, should enable students of part-time and full-time education methods and students of secondary technical schools to obtain knowledge and skills that are currently demanded in professional practice. By means of the application examples and practical demonstrations, students will obtain an overview of the basics of programming CNC machines programming and CAD / CAM systems (design and manufacturing of parts).

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ACTUAL SITUATION

Traditional forms of education did not sufficiently reflect the requirements of the labour market for practical information and the knowledge and skills in the field of engineering technology (1). Theoretical knowledge that students obtained in traditional education cannot be applied in practice, while it is predominantly time-limited. Since the interest in the study of social sciences predominates, there is a lack of graduates of technical high schools and universities focusing on engineering technology and industrial practices that are extremely desirable. Therefore, it is necessary to apply innovative and experiential forms of learning in this area. In order to make technical education programmes in our schools more attractive, the following measures should be taken:

- to educate general audience about the importance of engineering technology for the future of the Slovak Republic,
- to extend and generalise the experience in teaching the subjects related to engineering technology,
- to develop quality teaching materials for foster creativity, design textbooks, computer programs, ideas for projects, etc.
- to apply innovative forms of teaching in the area.

Currently, STU MTF UVTE keeps up successfully with professional experience in this field, especially through the Centre of Excellence 5-axis machining, which is considered a special department producing scientific knowledge at the global level (2). Centre of 5 - axis machining is characterised by high technical qualification, innovative approach and creativity.

Engineering practice and the aerospace industry require more and more production of free-form surfaces. The Centre will therefore focus on the production of free-form surfaces by 5-axis technologies (milling, turning and ultrasonic machining). This Centre is unique in Slovakia by the concentration of the latest HSC, multi-axis and multi-energetic technologies.

Fig. 1 *Machine tools in CE5AM (2)*

ON-LINE LEARNING ON MTF STU

On-line learning, which is basically “distant learning" for all those who are interested in learning, will be performed in the following way:

- the team members of the research team will provide all necessary information for the implementation of on-line dynamic learning (i.e. equipment of online classrooms, writing texts etc.),
- increase in the interest of high school students in the study at technical universities,

- improve teaching and expanding cooperation between training centres and the parent faculty,
- production of textbooks, presentations, e-learning materials, model examples, tests and tools that will help students understand the theoretical bases of CNC programming and CAD / CAM systems,
- design and implementation of a website which will contain all the learning materials (presentations, multimedia videos, examples and model tests), and will be available to students and to the general public.

To communicate with students, we suggest using TeamViewer software. TeamViewer software serves for remote support and on-line meetings (3). Figure 2 explains the principle of on-line education.

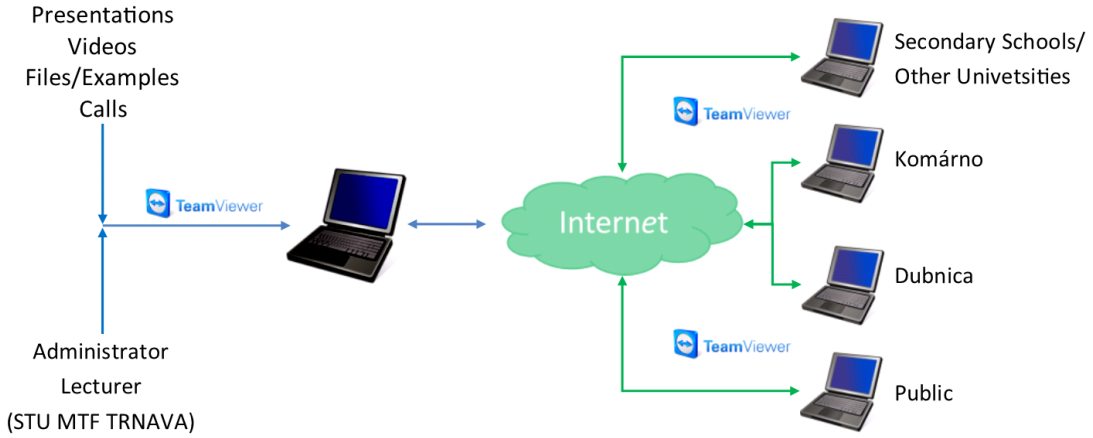

Fig. 2 *Scheme of On-line classroom for dynamic education*

THE RESULTS ACHIEVED IN THE PROJECT

In the second phase of the project, we met one of the main goals of the project. The textbooks were developed to assist the students in gaining practical and theoretical skills in the field of computer aided production technologies.

The examples designed in the previous period were complemented by the new ones; in total, 52 examples of engineering components for teaching CAD software (Fig. 3) and 19 examples of engineering components for teaching CAD/CAM software are available (Fig. 4). All are saved in a 3D pdf format (Fig. 5).

The elaborated bachelor and diploma theses were used in the instructional videos (tutorials).

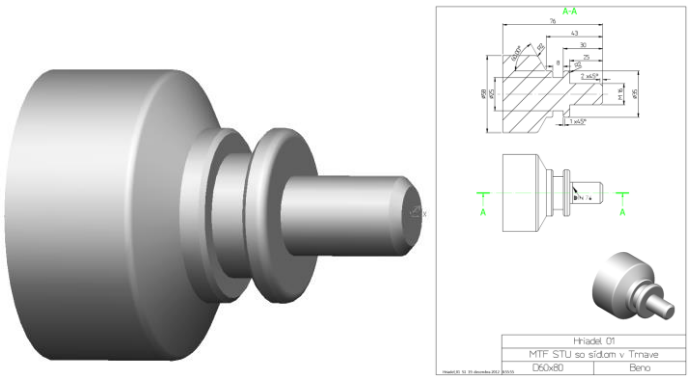

Fig. 3 *Example of an engineering component and drawing in CAD software*

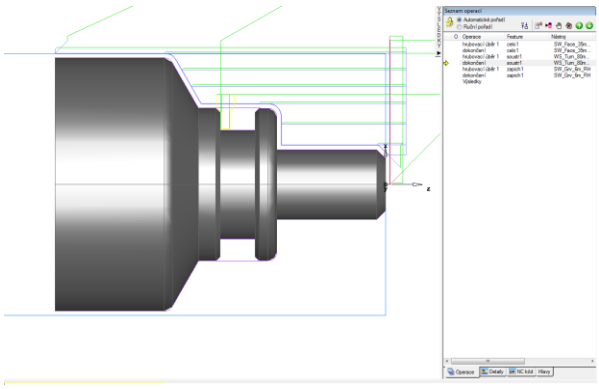

Fig. 4 *Example of an engineering component with toolpath in CAD/CAM software*

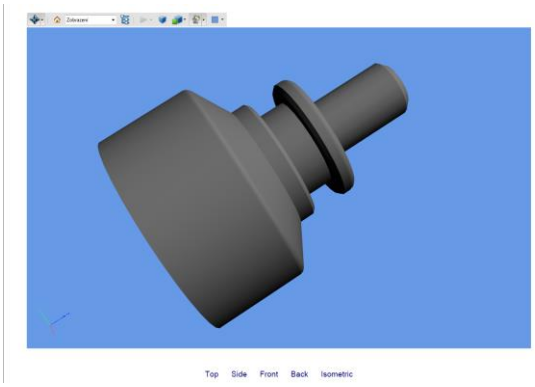

Fig. 5 *Example of engineering components saved in 3D pdf format*

We designed a web site by the title www.technolog.mtf.stuba.sk, which was gradually filled with the materials in the field of computer aided production technologies. The articles on 3D computer modeling, NC programming and computer aided manufacturing were also published on the website.

We composed a test in the field of Computer Aided Production Technologies I and Computer Aided Production Technologies II, which were used in the study at the parent faculty.

We delivered a presentation on the project in the Integrated Secondary Technical School in Trnava and the Secondary Grammar School in Vráble.

We installed the IP cameras for monitoring the processes during operation. The cameras were installed in the DMG machine tool 85 monoblock, HSC 105 linear, CTX alpha 500. Another purchased camera is installed to monitor the process of 3D scanning.

To evaluate the success of the introduction of new teaching methods, an answer sheet for the secondary school students and university students was designed. To publicize the videos, we designed the channel technolog.sk on www.youtube.com.

The next year, we will implement the following targets:

- to enhance the website content in the field of computer aided production technologies, model examples and videos, website expansion of video lectures,

- to implement dynamic learning in the MTF training centers (Komárno, Dubnica nad Váhom),
- to implement dynamic learning by using online classrooms for part-time students,
- to modernize the classrooms in the Faculty of Materials Science and Technology, training centres in Dubnica nad Váhom (VSD) and Komarno (VSKN), and to purchase computer technology.

SUMMARY

Current generation works mostly with electronic information and requires flexibility in education, and therefore we see great potential in the former alternative forms and the current online education. Online classroom for dynamic education of the secondary technical school and university students and implementation of the pilot online classroom for general education in CNC programming and CAD/CAM systems as well as for the accredited study programmes of Computer Aided Production Technologies (BSc.) and Computer Aided Design and Manufacturing (MSc) will provide dynamic education in following fields:

1. On-line real-time practical lessons.
2. On-line real-time testing and measurement.

ACKNOWLEDGEMENTS

This contribution was worked out within the frame of the KEGA 047STU-4/2012 project - Implementation of On-line classroom for dynamic education of the secondary technical school and university students focused on the design and manufacturing of free-form surfaces.

This contribution is also elaborated by the support of the Operational Project Research and Development of Centre of Excellence of five-axis Machining, ITMS 26220120013, co-financed by the European Funds for Regional Development.

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by European Founds for Regional Development.

We are supporting of research activities in Slovakia/
Project is co-financed by sources of ES

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