



INTERNATIONAL CONFERENCE

GOOD PRACTICES IN SKILLS DEVELOPMENT IN THE METAL AND ELECTRO INDUSTRY

BULLETIN OF CONFERENCE REPORTS



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GOOD PRACTICES IN SKILLS DEVELOPMENT IN THE METAL AND ELECTRO INDUSTRY

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International conference of the skillME project

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ACHIEVEMENTS OF THE skillME PROJECT

The **Skills in Metal and Electro Industry** or **skillME project** is a three-year Erasmus+ collaborative project between vocational education and training (VET) providers, national regulatory partners and representatives of the metal and electro industries of the EU member states **Croatia, Latvia, Slovakia** and **Slovenia**, which aims at **identifying the most endemic skill gaps in the metal and electro industries** and **developing curricula to fill those gaps** that will be implemented into national VET systems.

In the first half of the project, project partners **identified four most pressing skill gaps** among students and workers in the metal and electro industry of the participating countries, which are: **READING TECHNICAL DOCUMENTATION, CAD/CAM SYSTEMS, MACHINE VISION, and COMPOSITE MATERIALS.** Next, partners **designed curricula and training materials** to fill these gaps. As the field of reading technical

documentation varies greatly between the metal and electro industry, **two separate curricula** have been developed for the sectors. In the final project phase, partners have **implemented pilot trainings** for **students** and separately for **workers** of the metal and electro companies in all of the participating project countries, i.e. Croatia, Latvia, Slovakia and Slovenia.

The following pilot trainings and activities have been implemented per country:

... PILOT TRAININGS IN CROATIA

The Croatian skillME partner school **Technical High School Faust Vrancic** carried out **CAD/CAM** and **Composite Materials** pilot training. CAD/CAM training was done with 13 juniors attending mechatronics technician class during March and April 2017, whereas Composite Materials training was done with 11 sophomores attending Mechatronics technician class during March, April and May 2017.

The attracted **Electrotechnical School in Zagreb** carried out with their students **Reading Technical Documentation – Electro** pilot training and the **Machine vision systems** (automation) pilot training. Reading Technical Documentation – Electro pilot training has been carried out in March and April with 18 juniors attending Electrotechnician class.

According to the curriculum, students have obtained the basic knowledge for the aforementioned pilot programmes and the education gave them the insight about the progress and the application of the new technologies.

In organizing trainings for workers, educators, together with project representatives, gave emphasis to the most practical and interesting parts of the curricula in direct dialog with workers and focused on solving the situations they encountered at their work place and on filling concrete gaps in their practical knowledge.

... PILOT TRAININGS IN LATVIA

skillME pilot trainings in Latvia started in the beginning of the 2016/17 school year and took some time for organization and realization. These trainings attracted the interest of many students and companies due to its original content.

The skillME partner school **Riga Technical College – RTC** organized and hosted **Composite Materials** and **Machine Vision** pilot trainings. They organized two trainings for 34 students and two extended trainings for 20 employees.

The attracted Latvian school was **PECC Liepājas Valsts Tehnikums**, which implemented **Reading Technical Documentation** and **CAD/CAM** pilot trainings. Its new study equipment gave better training possibilities for additional practical work. Sometimes it was possible to combine the lectures with exhibitions or scientific events, such as the

“Tech Industry 2016” or PECC “Open door days”, as seen in the photo above.

According to the trainers, the piloting was successful as it brought many positive results, and all participants gained very good experience from it.

... PILOT TRAININGS IN SLOVAKIA

In Slovakia, pilot training activities were implemented at the project partner school **SOŠ Stará Turá** and attracted school **SOŠIT Bratislava** from January to May 2017 after previous studying and preparing materials for teaching and training.

SOŠ Stará Turá trained students and companies mainly in METAL curricula, i.e. **Composite Materials** and **CAD/CAM**. Both curricula have been added to special subjects, like practical training, technology, machinery engineering, automatization, and they have been also taught at extra after-school

lessons for students of the 2nd and the 3rd year of study.

Meanwhile, the attracted school focused on the ELECTRO curricula, i.e. **Reading Technical Documentation** and **Machine Vision**, both of which were offered to students as well as employees.

The project school attracted successfully companies, which agreed with cooperation within the project, and experienced trainers from the school led trainings for employees in their education centres. They have trained **employees of 2 big companies and 4 smaller companies**. Trainings were successfully implemented in all these companies by the end of March 2017. Employees considered pilot training activities in Composite Materials, CAD/CAM Systems and Reading Technical Documentation useful for their future carrier. If there will be more interest, project partners will organize new courses.

... PILOT TRAININGS IN SLOVENIA

The Slovene project partner **School Centre Celje** has provided two pilot trainings for their students and two pilot trainings for workers, namely **Machine Vision** and **CAD/CAM**, which took place from February to May 2017.

25-hours trainings for students were organized as an extracurricular activities. Even though the pilot trainings were outside the frame of regular curriculum, the interest of students was even greater than expected. 12 students have participated in the piloting of CAD/CAM and 14 students in the Machine Vision pilot. Due to great interest of students, more training will be provided for students outside of the project, which is already a great start of exploitation of project results.

The attracted Slovenian school, **School Centre Kranj**, has implemented the other two pilot trainings for students and workers, **Reading Technical**

Documentation – Electro and Composite Materials.

All of the trainers emphasised that students and workers gave a positive feedback after the end of the courses and showed great satisfaction with the piloting process.

The purpose of the **conference “Good Practices in Skills Development in the Metal and Electro Industry”** is to **share good practices and innovative approaches** in filling skill gaps, matching skills with labour market needs, developing new skills for new jobs and adapting national strategies in order to improve the quality and efficiency of vocational education and training and increase the competitiveness of workers.

In this bulletin, you will find conference reports that shed light on project achievements and experience from the perspective of all stakeholders involved in the skillME project – teachers, students, regulatory partners, and industry representatives from the participating countries of Slovenia, Slovakia, Croatia and Latvia.

We wish to thank all partners in our skillME dream team for their enthusiastic support, positive attitude and supportive demeanour on every steps of our way!

Janja Petkovšek
skillME Project Manager

METALWORK ACTION PLAN (2017) IN SLOVENIA

Employment Service of Slovenia

Vlasta Stojak, MSc

Summary

Paper addresses Metalwork action plan (2017) with which the Employment Service of Slovenia responds to the current labour market situation.

Survey »Employment Forecast«, conducted on the representative sample of employers with 10 or more employees, predicts employment growth. The highest growth rate is envisaged within manufacturing, which also includes metalwork industry. Welders, toolmakers, turners, electro engineering technicians, engineering technicians, metal moulders, polishers and grinders are occupations for which employers face frequent difficulties when searching for suitable candidates. In addition in our metalwork industry staff demand exceeds available job seekers supply thus we have decided for systematic approach towards described

labour market situation. Metalwork action plan anticipates close cooperation of key labour market stakeholders: Employment Service of Slovenia, employers, employer's associations and education institutions.

Action plan is being implemented on the basis of analysis of staff needs of the employers, analysis of candidates in the register of unemployed persons (which allows distinction between unemployed that already poses knowledge, skills and competences needed for job vacancies and those who are potential candidates for posts) and current active employment policy programmes. Key emphasis is given to the motivation of potential candidates for inclusion in trainings and employment within addressing industry and to close cooperation with employers with higher employment needs. Action plan involves trainings of candidates within the programmes of metalworking and mechanical engineering and enables preparation of tailored programmes for individual employers with higher number of planned vacancies as well as work places visits and preliminary trainings.

skillME FROM THE LECTURER'S PERSPECTIVE

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ABSTRACT

New technologies of the so-called Industry 4.0 are too complex for an individual to master them in depth. There is a need for competent experts from different fields of expertise. Also, different legal entities (companies, educational institutions, the Chamber of Commerce and Industry, etc.) must participate in order to finally achieve a key result; "Modern" knowledge and competitiveness on global markets.

The SkillME project is certainly an example of good practice in this field. Well designed and superbly executed. School Center Kranj participated in the preparation of materials for COMPOSITE MATERIALS and the implementation of lectures and exercises in the amount of 24 school lessons. This is a specific,

in-depth content of the processing and use of advanced materials. Because of the complexity, it's almost impossible for one man to do this. For this reason, we divided the content into two parts.

The chemical part was carried out by Mrs Klavdija Stropnik, and the machine part by Mr Primož Kurent. The question I will try to answer in this article is how the lecturer can follow all modern trends in science and industry and successfully forward them to the audience. The challenge for the lecturer is that employees in the industry who are already engaged in this field come to this kind of education, but not at such a difficult level or as a result. They want concrete solutions to their problems. They came up with new knowledge, experience and successful examples from the industry. How can these innovations be followed by a lecturer in order to provide the most up-to-date knowledge, is a big question.

In the first place, the lecture has to follow the innovations in the field of industry and science. The teacher has to deepen the theory. This is in fact the easiest part because there is a lot of information on the Internet on this topic. However, this is not enough for implementation in practice. It is necessary to work concretely with materials and new

technologies. This is achieved in such a way that the educational institution has its laboratories and facilities where industrial process simulations can be carried out. If there is no such option, it is necessary to work in the "home" industry (also through the DPKU project - Raising professional competences or by going abroad for a fixed period through the ERASMUS + project).

KEYWORDS: SkillME, education, composite materials, ERASMUS+

COMPOSITE MATERIALS – NEW AGE OF THE USE

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ABSTRACT

At the School centre in Kranj at the Secondary Technical School, we started with the skillME project in the school year 2015/16. During this time, we started with the arrangements for the material and how the project will be held. The purpose of the project was to inform employees and students with new materials. The project was in full swing in the school year 2016/17, when we began with the implementation of lecture for employees in companies and for students.

Presentation composite materials for the employees was held from 3. 4. 2017 to 19. 4. 2017. The presentation is divided into two parts. The first part was theoretical, that employees learn about innovations from the field of composites. The second part took place in the laboratory, where they learn

about the properties of different materials. Students are composite materials began to learn from 12. 5. 2017 to 27. 9. 2017. Their term is extended due to the practical training with the work. Also in the youth

was the presentation divided into theoretical and practical part. Students composite materials realized with mechanical and chemical areas. In the chemical field have been presented different structure and stitching of the different materials in the composite.

Composite is made up of different materials which differ in chemical and mechanical properties. The boundary between them is clearly defined, because the individual components to identify by the naked eye. Components are spatially combined and one ingredient must be a federal (basic), the second component, however, is interrupted and divided (consolidating phase).

Composite materials are materials of the future. 21. century getting the composite materials a very great importance, because they have become indispensable in the aerospace, aviation and military industry. They are found in automobiles and food packaging.

TRANSLATION OF PROFESSIONAL TERMINOLOGY AND TEXTS

Meta Arnež

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ABSTRACT

A successful translator in the field of professional terminology in texts must be an expert in both the professional field of the text, and also a great language connoisseur. This includes the knowledge of basic concepts of a specific profession, knowledge of professional terms and an extraordinary understanding of phenomena in that field. The translator must also well know the style in which professional texts are usually written so that the original text can be successfully presented in the target language.

It should also be added that no school or faculty can induct a translator into a field of expertise, but rather it depends on the translator to get to know the field and to professionally investigate it in order to make the

translation adequate and precise. It is also extremely important that the translator is aware of the basic goal of the professional text and, above all, knows who it is intended for. Raising a text to a certain professional level is one of the major challenges in this type of text. The delivery of expertise is a special skill, which not necessarily every translator possesses.

This applies both to translations from English to Slovene as well as vice versa. It is more difficult to translate into a foreign language, and it is easier to translate into a mother tongue. A good translator will find ways with modern research tools that will make it easier to explore the field of expertise and translations.

KEY CONTENT: English, Slovene, professional texts, professional terms, translation

READING TECHNICAL DOCUMENTATION – ELECTROTECHNICS (25-hour training within the »skillME« project)

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ABSTRACT

In the article, I present the implementation of test education or 25-hour training for students and employees within the project "skillME" on the topic "Reading technical documentation - electrotechnics". The aim of the project, which links VET providers, national regulatory partners and representatives of the metal and electrical industries, is to identify the most widespread gaps in knowledge in the metal and electrical industries and to develop state-of-the-art educational programs to address these gaps, thereby

ensuring the sustainable development of the European metal and electricity market.

As one of the four selected areas - Reading technical documentation in the field of electrical engineering, the following three learning outcomes are recorded in the curriculum:

- identification and description of the type of documentation in accordance with the norms and standards, - description of electrical elements and devices, and explanation of the operation,

- description and implementation measurement and diagnostics. In April and May 2017, we co-operated with one co-worker for a group of students and a group of employees. With students, we enriched and upgraded their knowledge. In the future, I will enable students to do more individual work. The implementation problem can be too large groups (not more than 10 participants). For employees, priority is mutual exchange of experience and work on a particular situation. In order to achieve a better quality performance, homogenous groups of participants are desired.

In any case, it is worth proceeding in this direction, as this project is set. Technical schools should be in

support of companies, but on the other side, they can help schools in carrying out training in terms of material and technological conditions.

Key words: Educational program, technical documentation, scheme, Standard, measurement.

MACHINE VISION – CAMERA USAGE FOR ROBOT CONTROL

Jakub PERICKA, Radovan PETER

Secondary Technical School Stará Turá
(STSFV), Stara Tura

ABSTRACT

With the modern industry focused on automation of all manufacture processes, there is a growing need of technicians and programmers with the know-how of robotics, automation, and last but not least, machine vision.

Before we entered the project, there had been not enough learning materials for students of this division. Even for our project there were few materials that we could learn from. Most of them were videos and internet documents. So we came up with the idea of an interactive, funny and

educational tool – the demonstration of cooperation between the intelligent camera and the robotic arm on the game of Ludo.

The main component of our project is the intelligent camera Cognex In-Sight 7230 which inspects its field of view, looks for a dice, returns its position and counts the dots on it. Next, the camera sends this information to the arm and then it moves the pieces on the board. With its spreadsheet software, it is very easy to use and program. It also provides EasyBuilder software for not so complicated applications.

The camera has resolution of 800x600pixels, it can handle up to 102 frames per second and has an integrated LED light source. It is suitable for almost every application the modern industry may need. The communication between camera and the robot works via LAN and uses an ADAM network switch to connect a computer as well. There is an option of adding a WiFi router to connect wireless devices

as well. The robot is programmed by the RobotWare software from its manufacturer.

In our project, students can learn how to operate the camera and how to make their own applications.

They learn some things about the robot as well, because it is a very useful know-how, too. The advantage of this project is that it is original but it also provides knowledge of important aspects of automation. It is a useful addition to the growing family of interactive educational tools.

skillME PROJECT IN THE CONTEXT OF DUAL EDUCATION IN SLOVAK REPUBLIC

The Association of Electro-technical Industry of the Slovak
Republic (ZEP SR), Bratislava
Speaker: Andrej Lasz

ABSTRACT

A dual education was introduced to the Slovak education system three years ago.

What was the history of establishing the dual system and what is the current situation? What are the main benefits and challenges of the dual system?

How projects like skillME are being helpful for the dual education?

Besides having the dual education established in Slovakia, there has been another important national project "National framework of Qualifications" initiated. The project deals with accepting as well as comparing qualifications acquired thanks to formal and non-formal education.

skillME PROJECT RESULTS IN THE CONTEXT OF THE REORGANIZATION AND MODERNIZATION PROCESS IN VET IN LATVIA

National Centre for Education (VISC), Latvia
Speaker: Laura STRODE

skillME project results complement reorganization and modernization processes in Latvian VET system.

The most important processes in VET in Latvia:

- **Modernization of VET school network.** Reducing fragmentation and overlap – developing strong sectoral players – VET Competence Centres that can serve different target groups. Investment in infrastructure and equipment of VET competence Centres
- **Mechanism of cooperation with labour market.** To strengthening VET sector cooperation with employers, 12 Sectoral Expert Councils have been founded and play active role in VET policy in 14 sectors

- **Modularization of VET curricula.** To prepare specialists for industries, Latvia started reorganization and modernization of VET curricula in 2012. 14 Sectoral Qualification Structures have been developed with maps of qualifications, 86 new occupational standards have been developed (in Metal Industry -8) and 56 modular VET programmes (in Metal Industry - 6) based on learning outcomes have been designed.

The following significant reforms are being currently implemented in VET:

- Improvement of the vocational education institution network and modernisation of VET school infrastructure;
- reforming VET curricula and introducing modular VET programmes. Within the ESF project until 2021 it is aimed to consummate 14 sectoral qualifications structures:
 - develop 160 occupational standards/occupational qualification basic requirements;
 - develop 184 modular programmes;
 - develop examination content for 210 professional qualifications.

- **Work-based learning.** To increase the number of students participating in work-based learning in enterprises, the project was launched in 2017 with ESF support. It is planned to attract 3150 students to work-based learning programmes by 2022.
- **Boosting the capacity of VET institutions in adult education.**

All four VET programmes – Composite Materials, Machine Vision, CAD/CAM and Reading Technical Documentation – designed in Erasmus+ programme “Skills in Metal and Electro Industry – skillME” have been piloted in **Riga Technical College** and **Liepaja State Technical School** in both ways: integrated in curricula of Metal Industry and as in-service training programmes for workers in Metal Industry.

The programme “Composite materials” has been licenced and accredited as an in-service programme in Riga Technical College.

According to existing legislation in Latvia, all four VET programmes – Composite Materials, Machine Vision, CAD/CAM and Reading Technical Documentation – designed in Erasmus+ programme “Skills in Metal and Electro Industry – skillME” can be licenced and accredited in 2 ways:

- In initial VET programmes in Metal Industry all programmes can be licenced as a part of the VET programme (C part module). The director of VET school can approve the corrections and improvements in accredited programmes up to 10% without recurrent submitting for licencing and accreditation.
- As in-service programmes for workers in labour markets, these programmes can be implemented approved by the director of VET school.

skillME PROJECT RESULTS AND OVERVIEW ON VET IN CROATIA

Marija ŠUTINA, Croatian Employers' Association (HUP)
Nino BUIĆ, The Agency for Vocational Education and Training
and Adult Education (ASOO)

The presentation focuses on the delivered outputs, learnings and benefits gathered in the skillME project in Croatia, discussing the challenges and good practices in successfully overcoming them. After 36 months, the process had an impact on collaboration between national partners. The national partners have strengthened the link between educational institutions and employers and got better flow of information's on new accomplishment in the field of technologies and production, on teaching and learning, and on labour market needs. The dialogue about the present and future employers' demand has taken place and it will be used as support in future development of Croatian VET.

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Skills in Metal and Electro Industry



Metal Processing Industry Association



National Centre for Education of the Republic of Latvia



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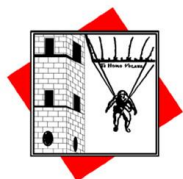
ZEPSR

Association of Electrotechnical Industry
of the Slovak Republic



CEA

Croatian Employers' Association



STROJARSKA TEHNIČKA
ŠKOLA FAUSTA VRANČIČA

SIOV

štátny inštitút
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vzdelávania



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