

Study of Results

Deliverable 3.4

Date: 31st October 2019

Version: 2.0

Project 585186-EPP-1-2017-1-FI-EPPKA3-VET-APPREN



Co-funded by the
Erasmus+ Programme
of the European Union

under the grant agreement 2017 – 2091 / 001 - 001

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

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Dissemination level

Code	Access granted to	
PU	Public	x
PP	Restricted to other programme participants (including the Commission Services)	
CO	CO Confidential, only for members of the consortium (including the Commission Services)	

Revision history

Version	Date	Author	Description
1.1	20.8.2019	Jouko Broman	Initial Draft
2.0	31.10.2019	Rauni Jaskari	Final version

Document status

Status description	
For Information	
Draft Version	
Final Version (Internal document)	
Submission for Approval (deliverable)	
Final Version (deliverable, approved on)	x

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1 Introduction

In 2017, four higher education institutes from Finland, Germany and France, together with industrial and institutional partners, submitted the proposal 'RADICAL - Filling Skills Gaps in Blue Industry by Radical Competence Boost in Engineering VET' project under the coordination of Turku University of Applied Sciences (TUAS) which is currently funded by the Erasmus+ program of the European Union. The objective of the project is to introduce a new educational approach in Finland – the possibility of making a bachelor's degree through workplace-based learning – so that almost half of the studies will be performed in industry.

The RADICAL project can be seen as a fundamental reformation of the industry-Higher Education Institution (HEI)-student cooperation in Finland. The project offers a new model for students and professionals in the career path towards new and better jobs, especially in the Blue Sector of Southwestern Finland. The core of the ENGINE (Engineering Innopeda Education) model developed in the RADICAL project is a new regional implementation model for post-secondary engineering education supported by a business mentoring model.

The objective is to provide high quality combination of higher education and work-based learning, leading students to have both a full bachelor's degree and in-depth practical experience at the workplace. The students will follow the same curriculum as the students studying with the traditional way and, thus they will have the same degree and studying content as in the traditional learning mode. However, the ENGINE model will provide the opportunity of alternating theory and practice simultaneously, as the student will spend part of the week at university and part of the week at the workplace.

The purpose of this document is to discuss the learning results from the pilot implementation from the perspective of students, organizations, mentors and HEI. The *ENGINE* model pilot in spring 2019 gave information about the overall student and company needs as well as about the support needs for mentors.

2 Higher Education Institution - Turku UAS

The objective of the pilot was to test in practice *ENGINE* model that was under development in the Radical project. Target was that all the elements of the model would be tested: company enrollment, student selection, agreement making, learning tasks in the company, scheduling of the studies, evaluation and mentoring.

First, the suitable pilot partners had to be found. Second challenge was to find the pilot students and selecting and agreeing on the suitable learning contents for the pilot period. The work contracts with agreeable content had to be signed and the description of what evidence the student will provide of his learning and how the outcomes will be evaluated had to be agreed.

Through the testing of the model, the institution was given the opportunity to work closely with companies. From the HEI point of view of, the pilot raised some practical problems (eg. agreement making) that it was prepared to tackle based on the information from international partners that were experienced with dual studies. In addition, practical problems with scheduling the studies in particular were a challenge during the pilot phase.

Workplace learning puts new demands on the HEI. HEI must understand the needs of the companies and give basic knowledge that student should have when starting to work in a company. This improves the HEI's touch about the companies problems of today and brings companies and HEIs closer to each other.

The model helps the students to understand the entirety and importance of applying the knowledge in practice in a concrete way. All theory that supports the performance is essential to understand. A more general approach may sometimes be useful also for the specific companies.

After the pilot the feedback sessions with the company representatives and the pilot students in order to collect information on how the model could better support the needs of companies, students and HEI. Evaluation discussions between the three parties were held to evaluate the students' learning.

3 Companies

There were two companies piloting the model. One was selected based on partnership in the Radical project and the other due to previous cooperation with TUAS.

Meyer Werft Turku (P4, pilot company 1)

MEYER TURKU Ltd., a partner in the RADICAL project, is a company designing and building innovative, tailor-made cruise vessels and ferries. The ships are built in Turku shipyard.

The company had two third year students working as part of their logistics function. The project was challenging, as it was a real-life problem that students had to tackle. The students investigated problems in the logistics process of the manufacturing and tried to find reasons for missing material in the chain. The end report presented the reasons for problems and solutions to decrease and eliminate the mistakes.

The pilot project was delayed due to bureaucratic reasons, lasting 9 weeks instead of the planned 10. Main reasons for the delay were agreement process and after that the winter vacation period.

The company offered a possibility to learn companies' ERP system and using of Excel in a job-related way.

According to Meyer representatives, it is essential to define the given tasks carefully. The subject of the task or project should be concrete and easy to understand and adapt. Time is usually limited, however it is easy to redefine and alter the given task as may be required.

Carinafour (pilot company 2) is a company developing and operating modern production systems and supply chain processes operating in Turku business area. Its annual turnover is 8 Million Euros.

The company wanted to have deeper cooperation with TUAS in order to influence the skills of future engineers. Thus, participating into the project was the best way to do so. Carinafour knows its needs for qualified workforce and has actively been developing the *ENGINE* model. *ENGINE* model resolves the skills gap identified also by Carinafour.

The required skill profiles and respected capabilities are established, and they know what kind of individuals the company will need in the future. On the other hand, the students may bring along some new and valuable fresh ideas to further improve their way of doing things and running processes.

In the pilot, one student, who also was an existing employee of Carinafour, participated the *ENGINE* studies. He was given a rather challenging responsibility to plan the work scheduling and resourcing for the summer period.

According to both pilot companies, tutoring and guiding the students requires more time than expected at least in the beginning. Therefore, the mentoring model suggests some guidelines for job orientation.

Industrial Management and Engineering students have good capabilities to analyze the current processes and practices and suggest improvements, as well as conduct different types of measurements and studies.

For the successful results the company also has to offer tasks challenging enough, yet the level and content of workplace learning has to be well planned and in accordance to the academic and curriculum requirements.

4 Mentoring in the company

Mentoring is an essential part of the ENGINE study model. The pilot would have benefitted from strong mentoring actions to qualify the mentoring process. Unfortunately, due to the delayed starting of the pilot and lack of resources in companies the mentoring was not performed as planned. The purpose of mentoring is to provide guidance to a mentee.

The pilot period was quite short, which did not support the mentoring process requirements. The building of mentoring relationship requires time in order to develop trust and the relationship in general.

The lack of resources may be a risk for successful mentoring in the future in all ENGINE cooperation companies.

5 Students

The developed model was piloted during spring 2019 with three students conducting their studies with *ENGINE* model. The companies where student conducted their piloting were Meyer Turku Ltd. and Carinafour Ltd. Two students conducted 15 ECTS studies of production management and LEAN at Meyer Turku Ltd. One student conducted operations management and logistic as well as Materials Management at Carinafour Ltd, achieving totally 10 ECTS.

According to discussions with the students and to their learning diaries, the participating students were satisfied with what they had learned. The students reported that their level of learning was deeper than what it would have been if they had studied in a traditional way. They saw the working opportunity as a lesson of real life that exceeds studying in HEI alone.

“To be allowed and abled to work in a selected motivated company has been a refreshing experience compared to studying at the institution entirely” (Student 1, <https://youtu.be/ejkvjpv3mfo>).

Students’ pilot experience contained mostly positive feedback, such as being able to do hands on work, knowing company premises and routines, being able to get more work experience.

*“It has been nice to come to the workplace and see what happens in the real world compared to the theory given at school. Learning according to the *ENGINE* model means that we are a few day of the week here at the company premises and are allowed to participate and learn hands on many interesting things. It is possible to get familiar with the everyday routines and make project like tasks as part of the routines. We do see more and in real life compared to the theory only at the Institution. This type of an experience may look better in CV, too” (Student 2, <https://youtu.be/ejkvjpv3mfo>).*

One of the things that required special arrangements during the pilot was scheduling students’ work in the companies. During the pilot, both students spent 2 days every week in the company. As the students were engaged in normal degree studies, their working days were organized according to their current courses at the HEI.

In the pilot, students have learned and utilized skills that are not described in the course learning objectives. The students felt that to study with *ENGINE* model was challenging, but in a constructive way. The environment differs a great deal from the traditional study circumstances at the institution. They felt they learned quicker and more efficiently. They also knew how their knowledge is applied in practise.

This reflection of learning is based on students’ own experiences. No qualitative studies have been made in comparison to the traditional study model regarding the learning outcomes.

6 Conclusions

Today's reality puts requirements on learning in cooperation between institutions and industry. The cooperation is essential for the competitiveness of the businesses and the quality and development of teaching and learning.

The final responsibility of the content of the curriculum and academic studies stays with the institutions, while the industry has now a natural channel of being able to give input to the contents and procedures as well as provide a learning setting for the practical part.

Both pilot companies are continuing with the ENGINE model, and will take new first year students to grow within the organizations.

Participation in the RADICAL project pilot gave Carinafour an opportunity to efficiently map and educate those individuals that they are interested in recruiting for the future.