

TECHNOLOGY COMPANIES CONTRIBUTING TO THE TRAINING OF VET STUDENTS

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Abstract

Over the last few years, following the objectives and recommendations of the European Union, EU member countries have begun to implement educational laws that update VET education, making it more attractive to young people and focusing it on the demands of the labour market. In this context, in Spain, Organic Law 3/2022 of March 31st 2022 was approved, which will implement a new model of Vocational Training able to respond flexibly to people's interests, expectations, and aspirations for vocational qualification throughout their lives. The new model is organized as a dual system in which companies and educational centres share the responsibility of the training of students.

In the business world and in society in general, the training that a worker acquires in their company has always been valued. Work experience involves training in transversal skills such as commitment and responsibility, integration in work teams, oral and written communication, honesty, and others. What is proposed in the new Vocational Training System goes, however, much further. The dual nature of vocational training implies the co-responsibility of the company in the training of students throughout their professional career, both in specific competences of a given professional qualification and in skills that facilitate their adaptation to the evolution of technology (especially to the energy, ecological and digital transition), to changes in jobs in a company or to changes in their professional career in pursuit of their own interests and expectations.

However, this poses a challenge for the companies participating in this system and the need to generate new methodologies themselves. The path is not easy, and companies need tools to help and support them in welcoming the new model of VET student placements in the technology sector, in which the company has to contribute to the students' acquisition of the learning outcomes set out in their study plan.

In this communication we present the "TRAINING COURSE FOR COMPANIES ON HOW TO IMPLEMENT THE NEW MOBILITIES", developed by expert researchers and teachers in the framework of the Erasmus+ project "Building the vocational training of the future: companies and educational centres facing the challenge of the organization and integration of a more inclusive and digital VET". This is a course aimed at technology companies with the objective of offering recommendations and tools to adapt the reception of VET students, especially those with obstacles, to the new structure of vocational training, and to help them to generate the necessary figures for this, such as the dual tutor in the workplace.

Keywords: Vocational training, technology, critical thinking, methodology, research, students, evaluation.

1 INTRODUCTION

In the business world and in society in general, the training that an employee acquires in the company where he/she works has always been valued. Work experience implies training in transversal skills like commitment and responsibility, integration in work teams, oral and written communication, honesty and others. What is proposed in the new Vocational Training System, established by Organic Law 3/2022 of March 31st 2022, however, goes much further [1]. The dual nature of vocational training implies the co-

responsibility of the company in the training of students for their entire professional career. This includes both formation in specific competences of a given professional qualification and in skills that facilitate their adaptation to the evolution of technology, especially to the energy, ecological, and digital transition. This should also enable the student to adapt to changes in jobs in a company or to changes in their professional career in pursuit of their own interests and expectations. Companies participating in this system will face an important challenge and the need to generate new educational methodologies themselves.

Dual training is aimed at the whole range of vocational education and training degrees, but possibly in the fundamental ideas of how to implement it there will be many common features across all degrees and all vocational families. We have implemented the "TRAINING COURSE FOR COMPANIES ON HOW TO IMPLEMENT THE NEW MOBILITIES" developed in the framework of the Erasmus+ project "Building the vocational training of the future: companies and educational centres facing the challenge of the organization and integration of a more inclusive and digital VET", FUTEREVET. We focus it on the educational methodology we propose to the company, especially to small and medium-sized technological companies, to achieve part of the learning outcomes foreseen in the student's degree. Under the new Spanish law, the percentage of participation of companies is 25% or more. It is therefore necessary to provide companies with tools that allow them to organize effective training activities so the student achieves the expected results in a relatively wide range of competences.

In a curricular internship, a student joins a job and for a few months carries out tasks related to that position. Their training and personal development comes mainly from the fact of immersing themselves in a work environment, possibly their first experience in this environment, as well as from on-the-job training and the commitment to the company's operating rules. In the new Vocational Training System, it will be necessary to systematize this training because many of the aspects that are required from the training that the company provides to the student will not arise spontaneously, but it will be necessary to plan specific training activities for their development. An example is the key competence of *learning to learn*: depending on the position to which the student is most related, it will not require him/her to develop strategies for information search, critical analysis, comprehension and organization. If it is considered that in-company training can make an important contribution to the development of this competence, it will be necessary to include in the student's work plan tasks that require this competence and to think about the methodology to help him/her acquire it. Something similar can be said regarding other key competences such as linguistic communication, expressing oneself effectively orally and in writing, digital competence, entrepreneurship, and others.

Technology-based companies are in a favourable position to contribute to training the student in a wide range of specific skills related to their sector, even if the position in which the student is most involved during his or her stay in the company is not directly related to them. For example, in the degree of *Technician in Metal and Polymer Forming by Molding* [3] and in a technological company with activity in the production of polymer parts by 3D printing. Probably this company has sufficiently qualified staff to tutor the training of a student in order to achieve the learning outcomes expected in modules of *Graphic Interpretation*, since it will handle different representation techniques, for instance *Preparation of machines and installations for automatic processes*, *Preparation of raw materials or Metrology and testing* that he/she will possibly use directly, but also *Mold and model making* even if he/she will not use them, and something similar related to *Forming by closed molding or Forming by open molding*. On the other hand, the contribution of the company to the training in the modules considered as transversal can be important, providing activities and experience that complement the educational center very well.

By this we mean that a company, even a small or medium-sized one, can make an open assessment of its own contribution to the training of a student for up to 25% of his or her training cycle. The way of participating in the teaching of specific competences of the degree will undoubtedly employ different methodologies from those followed in an educational center, and perhaps this different point of view is one of the main contributions sought in dual education. In the following sections, we will try to explain our views on how to implement effective in-company training in practice.

2 METHODOLOGY

The objective of this course is to present a methodological proposal for the training of students of a dual vocational training cycle in their stay in the company. The company is expected to participate in the achievement of certain learning outcomes of the degree that the student follows in addition to the results expected from the work activity itself in the company. This is a challenge in terms of the dedication of the company's staff, especially of the student's tutor in the company, and requires prior programming

and a methodology that makes the learning process effective and not too burdensome for the company in terms of the time of dedication of its staff to the educational tasks.

What we propose from the working group of the Erasmus+ project FUTUREVET [3] would be as follows: At the beginning of the training period in the company, the student will have already received in their educational centre a short course on prevention of occupational hazards. In the company, their tutor will give them the first explanations about their job and a (digital) notebook as a guide for their training. We call it the *training programming and follow-up notebook*. It will contain brief information about their personalized training program, but the bulk of the booklet will be filled in by the student themselves.

He/she should write down everything related to their job: objectives, experimental protocols, occupational risk prevention information specific to their job, waste management, etc. They will also collect all the results obtained, for example, experimental results of quality control analysis, designs, management documents and others. They will also be asked questions and exercises that will make them achieve the expected learning outcomes. The notebook collects all the student's activity, is filled in digital format, is hosted in a specific folder on a company server and complementary files such as spreadsheets, videos, machinery control files, administrative documents and others are added.

The notebook will facilitate the continuous monitoring of the student's progress and final evaluation. The organization of the notebook seeks to develop the student's critical thinking skills, to set objectives and relevant questions, to search for information, to analyse its reliability, to understand and organize it, to express themselves effectively in writing, responsibility, intellectual honesty...

The preparation of the notebook involves a process of reflection by both the educational centre and the company on the training activities proposed to the student. We hope that the effort dedicated to this preparation will be highly compensated by the ease in the development of the training. The evolution of the template of this notebook will serve to accumulate the experience that will be acquired in the training of students and will allow the company to improve the methodology used on an ongoing basis.

In the course for companies, we will go step by step through the preparation of a notebook for the training of a student in a fictitious company and we will ask our course students to prepare for them a similar notebook for a specific job position in their company.

Many of the observations we make are highly opinionated and should be considered as suggestions that everyone can take as far as they consider and improve them or adapt them to their specific situation.

3 RESULTS

As a result of this work, a course freely accessible on the VIRTUAL INCLUSIVE EDUCATION platform [4] has been prepared. In this step-by-step course, we have prepared what we have called a notebook for programming and monitoring training in the company following an example referring to a fictitious company. The first step is to reflect on those learning outcomes for which the company considers itself in a position to collaborate in training. The aim is to show that it is not necessary for these learning outcomes to be directly related to the company's activity. In fact, this is an important aspect for many small or medium-sized companies that are currently collaborating in the curricular practices of the students but that may find themselves without tools to train the student in contents or subjects that are that are outside their business plan. In fact, the learning outcomes as expressed in the norms that regulate the degrees often mix different subjects.

In fact, the learning outcomes, as expressed in the decrees that regulate the degrees, often mix different topics. For example, in a degree of *Higher Technician in Production Programming in Metal and Polymer Molding (Higher Degree)*, that we mentioned above, one of the learning outcomes is "Determines transformation processes by molding of metals and polymers, establishing..." [2]. If the company is dedicated to the production of plastic materials, it is possibly a complication to also have to comply with the training in metal molding. The approach of the course and the teaching methodology that we propose for the training in the company is aimed at showing that the company can contribute very effectively to the training of students not only in terms of general skills for their professional career but also in terms of specific subjects of the degree.

Notebook for the programming and monitoring of the training plan

Student:

Educational centre:

Company:

Starting date of the training:

<i>PART 1</i>		<i>TRAINING PLAN</i>	
Course		Company	
Educational Grade / Specialization Course / Certificate of Professionalism			
Student		e-mail:	Phone:
Training centre		e-mail:	Phone:
Tutor at the training centre		e-mail:	Phone:
Tutor in the company		e-mail:	Phone:
Special features			
Training period in the company		Calendar / timetable / period	
Total hours			

<i>Learning outcomes in in-company training periods</i>			
Professional Module	Code	Learning Outcomes	Activities
		Ra1	
		Ra2	
		Ra3	
		Ra1	
		Ra2	
		Ra3	

Signed: Tutor in the company	Signed: (student)	Signed: (tutor at the training center)
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<i>PART 2.- Workplace. Overview</i>		
Task Title:	Folder / Server:	Date:
Brief Description		
Area of the company or project in which it is framed:		

Objectives
Hypotheses, solutions that can be anticipated, and expected results.
Equipment / Machinery
Elements of occupational risk prevention:
Waste management.
Available Procedures (include a brief summary or notes of the documents already available, include the documents in annexes in the work folder, indicating here the name or reference of the file) <i>Include as many pages as needed</i>

PART 2.- Workplace. Conceptual issues.	
Explain the concepts in a clear and concise way and solve the exercises in the following cells.	
Question 1. Explain in 4 or 5 lines what you understand by ...	
Question 2. Why does it happen that ... ?	
Question 3. What is the difference between XXXXX and YYYYYY?	
Question 4. Mark the correct answer to the following questions among the 4 options that are posed:	
Bibliography search: <i>Include here the reference where you have studied these concepts, it can be a web page or a chapter of a textbook or some notes of a subject from your training center.</i>	Ra2

PART 2.- Workplace. Technical Information.	
Look for the following data or technical characteristics.	
Question 1. Look for the value of ...	
Question 2. Look for a procedure for ...	
Question 3. Find a supplier for ...	
Question 4. Mark the correct answer to the following questions among the 4 options that are posed:	
Bibliography search: <i>Include here the reference where you have studied these concepts, it can be a web page or a chapter of a textbook or some notes of a subject from your training center.</i>	Think and write very briefly how you decided on one type of bibliographic source or another.

PART 2.- Workplace. Processing, storage, and presentation of results.	
Carry out the following exercises.	
Exercise 1. Plot the following data in a diagram ...	
Exercise 2. Perform the following operations on your server folders ...	
Exercise 3. Data Operations.	
Question 4. Mark the correct answer to the following questions among the 4 options that are posed:	

Bibliography search: <i>Include here the reference where you have studied these concepts, it can be a web page or a chapter of a textbook or some notes of a subject from your training center.</i>	Think and write very briefly how you decided on one type of bibliographic source or another.
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PART 3.- Activities. Task 01 <i>(tasks will be added as needed)</i>		
Task Title:	Folder / server *:	Date:
Brief description		
The problem at hand.		
Hypotheses, solutions that can be anticipated, and expected results.		
Methodology and work plan:		
Initial information available (include a brief summary or notes of the documents already available, include the documents in annexes in the work folder, indicating here the name or reference of the file) <i>Include the pages you need</i>		

PART 3.- Task results 01		
Title:	Folder / server :	Date:
Additional information obtained during the task: Alternative testing methodologies, sources in which to contrast the data obtained, etc. Include the related files as attachments in the folder, indicating here the name or reference of the file.		
Experimental protocol (if there is already a written protocol in the company, just indicates its reference; if not, briefly detail the steps of the experimental procedure)		
PART 3.- Results of task 01		
Title:	Folder / server *:	Date:
Experimental results (if written by hand or printed by the device, photocopy or scan and copy them here as an image. Videos, photographic images, and other material will be added as attachments in the work folder, writing the name or reference of the file here) <i>(add as many pages as needed, copying the entire table)</i>		
PART 3.- Analysis of the results of task 01		
Title:	Folder / Server *:	Date:
Assessment of the result: Assess the reproducibility of the assay; does it match what was expected? If so, what is the reason why a result very different from the one found was expected?	Is the result accepted?	
Notes on conversations with the supervisor or other team members		
Conclusions (propose here the solution to the problem posed, but also the detailed conclusions about the task itself, about the experimental procedure, suggestions for new tests, etc.)		

PART 4.- Training contents	
Explain the concepts in a clear and concise way and solve the exercises in the following cells. The questions are sorted by topics related to the training outcomes we hope to achieve during your stay at the company. Before you start writing, you'll need to look up information on the topic and study that information.	
Topic 01 (Module XXXXXXXX learning result RA01)	Bibliography search: <i>Include in this cell the reference where you have studied this topic, it can be a web page or a chapter of a textbook or some notes of a subject from your training center.</i>
	Think and write very briefly how you decided on one type of bibliographic source or another.
Conceptual question: Explain in 4 or 5 lines what you mean by ...	
Conceptual question: How is XXXXX different from YYYYYY?	
Conceptual question: Construct a table with the properties of the material ...	
Mark the correct answer to the following questions among the 4 options posed:	
Problem: Calculate ...	
Characterization protocols: Characterization protocols: Look for the test of essay ... and briefly explain the way shape and preparation of the test specimens and the magnitudes to measure.	
Searching for technical information: Find the value of ... (for example, the electrical conductivity of copper)	
<i>To program this part of the training plan, we suggest to include one topic per learning outcome. The concepts and exercises admit of enormous variability, the types of content in the question and exercise cells are just a few examples of the types of questions that can be asked.</i>	
PART 5.- Self-evaluation	
The following questions are based on the evaluation criteria set out in the Royal Decree establishing the title of your training cycle. Think about whether what you have studied in relation to each question and the exercises you have done seems enough for you to master each of these aspects. Write a comment to this effect in the box on the right.	
CA1 Evaluation Criteria	
CA2	
CA3	
...	

4 CONCLUSIONS

The training of a student in the company, reaching the learning outcomes foreseen in the vocational training degree requires a methodology essentially different from the one followed in an educational center. We propose this training to be based on a strategy of teaching critical thinking skills, and in particular learning to learn, to the student. The training programming and follow-up notebook is intended to guide the tutors of the company and the educational center in the reflection on the programming of the training period in the company and guide the student in the reflection on how to look for information in a critical way, reflect on the different concepts and technologies that appear in their training and in their work place, their organization and understanding, also on the critical analysis of the results they are obtaining, and on how to communicate these results and knowledge in an effective way both orally and in writing.

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