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critical
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thinking

GUIDE FOR VET TEACHERS

THE TEACHER FACING A NEW, MORE INCLUSIVE VET MODEL



SOMATICA
MATERIALS & SOLUTIONS



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Within the framework of the Erasmus + project Building the vocational training of the future: companies and educational centers facing the challenge of the organization and integration of a more inclusive and digital VET, 2022-1-ES01-KA220-VET-000089436, we have developed a methodological proposal for the training of students in companies within the dual vocational training scheme (Law 3/2022). It also aims to encourage companies to understand and participate in the new Vocational Training System. We believe that the methodology we propose can help students acquire essential skills for their professional life, transversal skills such as critical thinking and autonomous learning skills, but also specific skills for their degree. Above all, we believe that it can be viable for small and medium-sized companies and beneficial for the quality of the work that the student does during their internship and can also be carried out with an acceptable dedication by the tutors that the student has in the company to whom we provide a tool to facilitate their tutoring work.

This guide is aimed at teachers of vocational training educational centres who are in charge of the training of these students in their centre. The objective is to show you our proposal so that in the event that one of your students carries out his/her training period in a company that is going to follow this methodology, the teacher can closely follow the progress of his/her student and contribute to it effectively, integrating in the best way the training that the student receives in the academic field and in the company. The collaboration between the teachers of the vocational training educational center and the tutors in the companies will be essential for the success of the training process.



INTRODUCTION



However, the path to the implementation of this new law is not easy.

In view of the challenges experienced since 2020, the European Commission has decided to promote Vocational Training by making it a benchmark for economic and social reconstruction, as well as to achieve the objectives expressed through the Council Recommendation of 24 November 2020 (2020/C 417/01) and coinciding with the 2030 Agenda and the OECD proposals.

Member countries have started to adapt their VET education laws to the new guidelines in order to achieve the proposed objectives. This is the case of the Spanish Government with the Organic Law on the Regulation and Integration of Vocational Training definitively approved in the Senate on March 23, 2022, which will be followed by many other countries such as Italy, Greece or Portugal.

The levels of access to vocational training in many countries are significantly lower than the objectives set (the enrolment rate, according to CEDEFOP reports in Spain is 12%, in Greece 11%, 10.6% in Italy and 20% in Portugal...) and the measures necessary to achieve the 29% target by 2030, will require a very important change both in the way of teaching and in carrying out internships in companies, involving a major effort by teachers and companies to develop new methodologies, new contents, new programming and new structures that give viability to the new economic costs derived from internships.

A radical change that, in addition, has the risk of leaving aside many students with obstacles, who unable to adapt to the new changes and overcome the obstacles posed by this new professional training, abandon their studies, closing one of their main doors for social, personal and labor inclusion that takes them out of exclusion.

In this context, with the Erasmus Plus project "BUILDING THE VOCATIONAL TRAINING OF THE FUTURE: COMPANIES AND EDUCATIONAL CENTERS, FACING THE CHALLENGE OF THE ORGANIZATION AND INTEGRATION OF A MORE INCLUSIVE AND DIGITAL VET." we have created this guide for Vocational Training teachers with the aim of paving the way for the implementation of the new vocational training and the laws that are being generated in this regard in order to generate a new model of vocational training that is more modern, more international and more oriented to the new needs of the labour market... Achieving all this without neglecting VET students with obstacles that require this training to access the labour market and achieve full social, personal, labour and educational inclusion.

As we will see in the following sections, the new models of vocational training are based on the co-responsibility of companies and vocational training centres in which the student achieves the learning outcomes foreseen in his or her degree.

In this project we have developed a methodology that we propose to companies and vocational training centers pursuing several objectives:



That the student makes the most of their training period in the company in terms of acquiring key tools to develop a stimulating professional career for themselves and that allows them to contribute to the development of society.



Facilitate the participation of small and medium-sized enterprises, including micro-enterprises with fewer than 9 employees, in the new vocational training system.



To make it easier for teachers in vocational training centres to organise internships in companies that do not leave out of the system students with obstacles of a personal, family or social nature. In particular, to facilitate the training in companies of students from disadvantaged regions with a weak industrial and business fabric.



To propose a methodology that allows the integration of the learning results achieved in the educational center with those obtained in the training periods in the company.

Our methodology is based on what we have called "Notebook for programming and monitoring training in the company". This workbook is prepared in advance of the start of the student's internship in the company and will guide the student throughout the entire training period in the company, helping them to acquire basic tools for their training throughout their professional life, but also specific content and skills provided for in the curriculum of their degree.

After a brief introduction to the new vocational training system provided for in the legislation, in sections 2 and 3, we develop in detail our proposal in section 4 describing what the whole training process would be like in a small fictitious technology-based company and in the case of a student of a specific degree. In the rest of the sections of this guide we will focus on how the educational center can contribute to the success of training in the company and how we think it can take advantage of the tools that the student acquires in the company to facilitate learning in later stages in the training center.



THE NEW VOCATIONAL TRAINING MODEL



The member countries of the European Union have begun to apply educational laws that adapt Vocational Training to the new guidelines in order to achieve the objectives proposed by Europe.

The European Commission has made vocational training a pillar of the common policy. In this regard, the Committee on the Regulation of the European Parliament and of the Council on the European Social Fund Plus in Council Recommendation 2020/C417/01 specifies that it seeks to "ensure a better adaptation of education and training systems to the labour market and equal access to lifelong learning opportunities for all, through itineraries of improvement of skills and professional retraining." [1]

The European Commission seeks to achieve a European Education Area in which training is of high quality, inclusive and allows the recognition of qualifications abroad. Specifically, Council Recommendation 2020/C417/01 specifies the recommendations to the member states of the European Union[2]:

In accordance with Union and national law, available resources, national priorities and circumstances, including the socio-economic situation and characteristics of national VET systems, and in close cooperation with all relevant stakeholders:

1. work towards the implementation of a vocational education and training policy that:

— equips young people and adults with the knowledge, skills and competences needed to thrive in the labour market and the evolving society, manage recovery and just transitions to the green and digital economy, in times of demographic change and across all economic cycles,

— fosters inclusion and equal opportunities and contributes to achieving resilience, social justice and prosperity for all, and — promotes European vocational education and training systems in an international context so that they are recognised as a global reference for vocational students;

(b) deploy actions and investments for the implementation of this policy, in accordance with the principles defined in points 1 to 21 below; and

(c) work towards achieving by 2025 the following EU-wide targets⁽²²⁾ that are part of the relevant European monitoring frameworks, including in the field of education and training and employment and social policies:

— the proportion of employed graduates from VET must be at least 82 %⁽²³⁾;

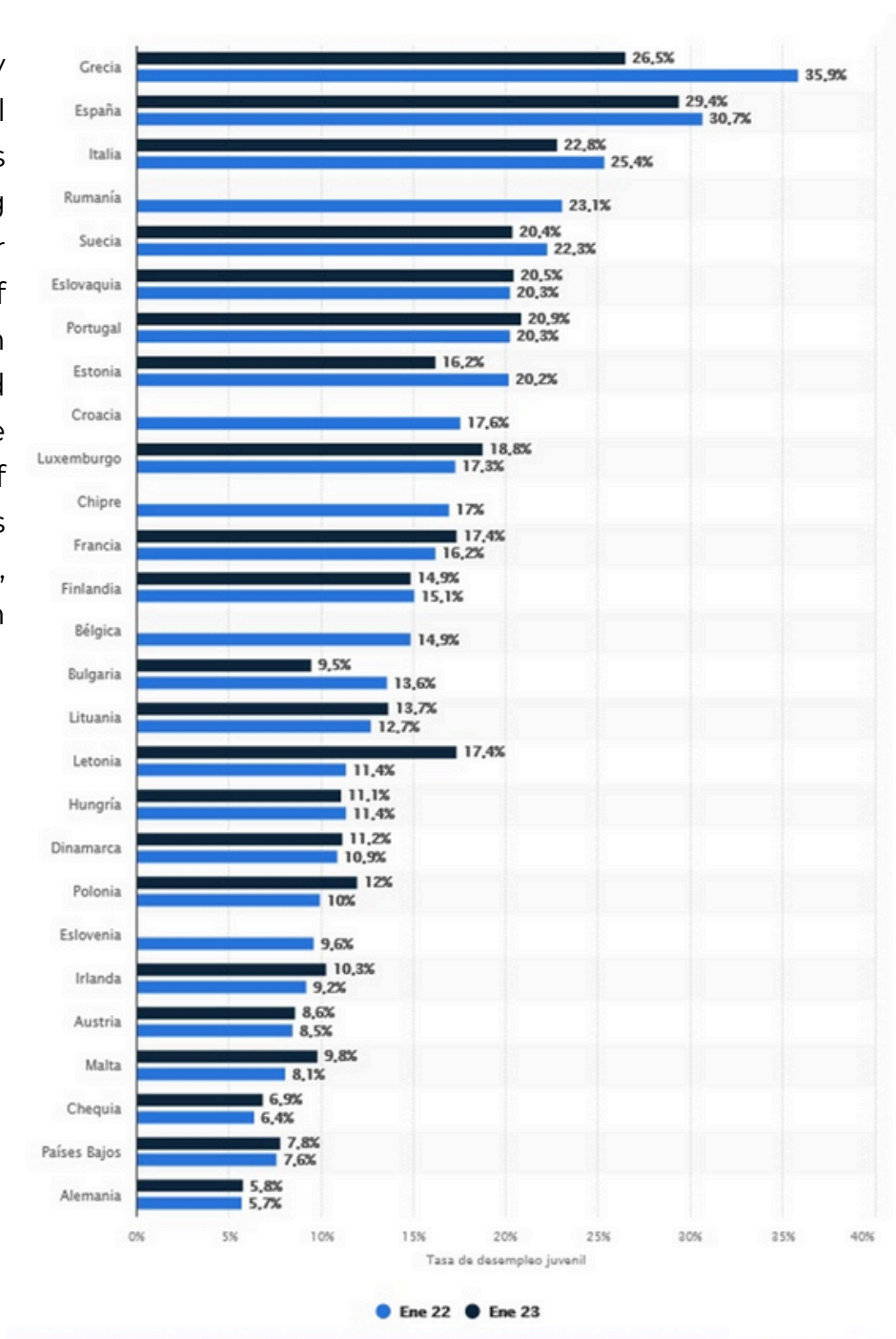
— 60 % of recent VET graduates benefit from exposure to work-based learning during their vocational education and training⁽²⁴⁾. This objective refers to all forms of work-based learning in the workplace, also contributing to increasing learning opportunities that can be supported by the Youth Guarantee;

— 8 % of VET learners benefit from educational mobility abroad⁽²⁵⁾.

In a context in which the youth unemployment rate in the countries of the European Union in 2022 and 2023 is so high, it is especially important to implement changes in Vocational Training with the aim of making it more focused on access to the labour market.

According to sources from Statista[3] (the German online statistics portal that makes official statistics available to everyone), in 2022, Greece was the country with the highest youth unemployment rate in Europe (35.9%), followed by Spain and Italy with an unemployment rate of 30.7% and 25.4% respectively.

The dual modality of Vocational Training emerges as a very promising factor for the labor integration of graduates in both intermediate and higher degree cycles in the light of the first statistics available in Spain, as we will see in later sections.



2.1. The new model of Vocational Training in Spain

In the case of Spain, in 2022 the new Organic Law 3/2022, of 31 March, on the organisation and integration of Vocational Training for the modernisation of Vocational Training in Spain was approved with the aim of improving standards and making vocational training more attractive to young people. All this, through the introduction of flexible learning pathways, as well as the updating and development of new educational programmes that meet the demands of the future of the labour market. The new VET model seeks to guarantee learning opportunities for all with a unified, flexible and easily accessible system.

The main objectives of the new Vocational Training model[4] are:



To develop a quality and equitable Vocational Training System.



To promote the acquisition, consolidation and expansion of the professional and basic skills necessary for access to the labour market.



That companies and productive sectors have competitive workers with the necessary knowledge and skills.



Carry out a continuous analysis of the supply and demand of professions, occupations and profiles in the labour market.



To offer up-to-date training that incorporates all professional skills, innovation, applied research, entrepreneurship, digitalisation, sustainability and the climate emergency.



To configure Vocational Training based on accessible, progressive, cumulative training itineraries adapted to the needs of each one.



Promote the dual dimension of vocational training, which is more linked to business.



Facilitate the accreditation and recognition of professional competences.



To offer a system of guidance and professional advice that helps decision-making, training management and is inclusive.



Promote equal opportunities.



To promote the acquisition of knowledge of foreign languages.



Continuously update the skills of teachers and trainers to adapt training processes to the needs of the labour market.



Continuously evaluate the new Vocational Training model to improve its quality.

2.1.1 Degrees of Education

The new Law establishes a flexible and modular offer divided into 5 ascending degrees, in which there will be offers linked to 3 levels. In this way, students will have the possibility to configure their own itinerary. The first three degrees (A, B, C) are aimed at those who have work experience in a certain sector, but do not have any qualification to accredit it. [5]

GRADE A

This degree includes the most basic training offers that allow the obtaining of a partial accreditation of competence that will include one or more elements of competences of a professional module. Access to this degree has no academic or professional requirements.

GRADE B

This certificate allows the student to obtain the Certificate of Professional Competence. Like grade A, it does not require academic or professional requirements. The certificate may be obtained either by passing the training, or by obtaining all the corresponding partial accreditations of competence of Grade A.

GRADE C

This degree allows the student to obtain the Professional Certificate through the training of several professional modules. Students will obtain this certificate both by passing the training and by obtaining all the corresponding Grade B certificates. The courses of this degree will include a period of training in the company.

The entry requirements will depend on the level:

- Level 1: they do not have academic or professional access requirements.
- Level 2: it will be necessary to be in possession of the Compulsory Secondary Education Graduate.
- Level 3: it will be necessary to have a Technician degree, a Baccalaureate degree or equivalent, a level 3 professional certificate, a certificate of competence included in the offer, or a level 2 professional certificate from the same professional family.

GRADE D

GRADE D. This degree includes the Basic, Intermediate and Higher Level Training Cycles.

The organization of these cycles will be modular, including:

- Professional modules associated with a standard of professional competence.
- Professional modules not associated with these standards, but with career guidance.
- Specific modules.
- Intermodular project. In the Basic Grade, a collaborative project will be carried out throughout the training cycle, while in the Middle and Higher Grades it may be annual or biannual (minimum 25 hours per course) and will be defended before the teachers and the tutor of the company (if required).

The Basic Grade training cycles are linked to level 1 of the competence standards and will consist of a communication and social sciences field, applied sciences field, professional field and an annual project.

On the other hand, the Intermediate and Higher Grade cycles are linked to levels 2 and 3 and will have a modular offer that will include a compulsory core part (which will include the organization mentioned above) and an optional part.

In terms of duration, the basic degrees will last 2 years, while the intermediate and higher degrees will last 2 or 3 years depending on the cycle. During this time, in-company training will be included in the Intermediate and Higher grades, while the basic degree only includes it in specific cases.

GRADE E

This degree includes specialisation courses that allow students to specialise in a specific field in the sector of the Training Cycle that they have taken and passed. They will last between 300 and 900 hours. In the case of students who complete and successfully pass an Intermediate Degree specialization course, they will obtain the title of Specialist of the corresponding profile. In the case of the Higher Degree, they will obtain a Master's degree in Vocational Training.

It should be noted that the training offers of all degrees may be taught in face-to-face, blended, virtual or mixed mode (with prior authorization from the competent administration). In addition, in the case of Grades C, D and E, the training offer may be complete or modular with the aim of adapting to personal and work needs and circumstances.

On the other hand, with the application of the new law, the entire training offer will have a dual character. In section 4 of this guide you will access the relevant information on the dual nature of training.



A NEW DUAL VOCATIONAL TRAINING



The training cycles will combine training processes in the educational centre and the companies or equivalent organizations

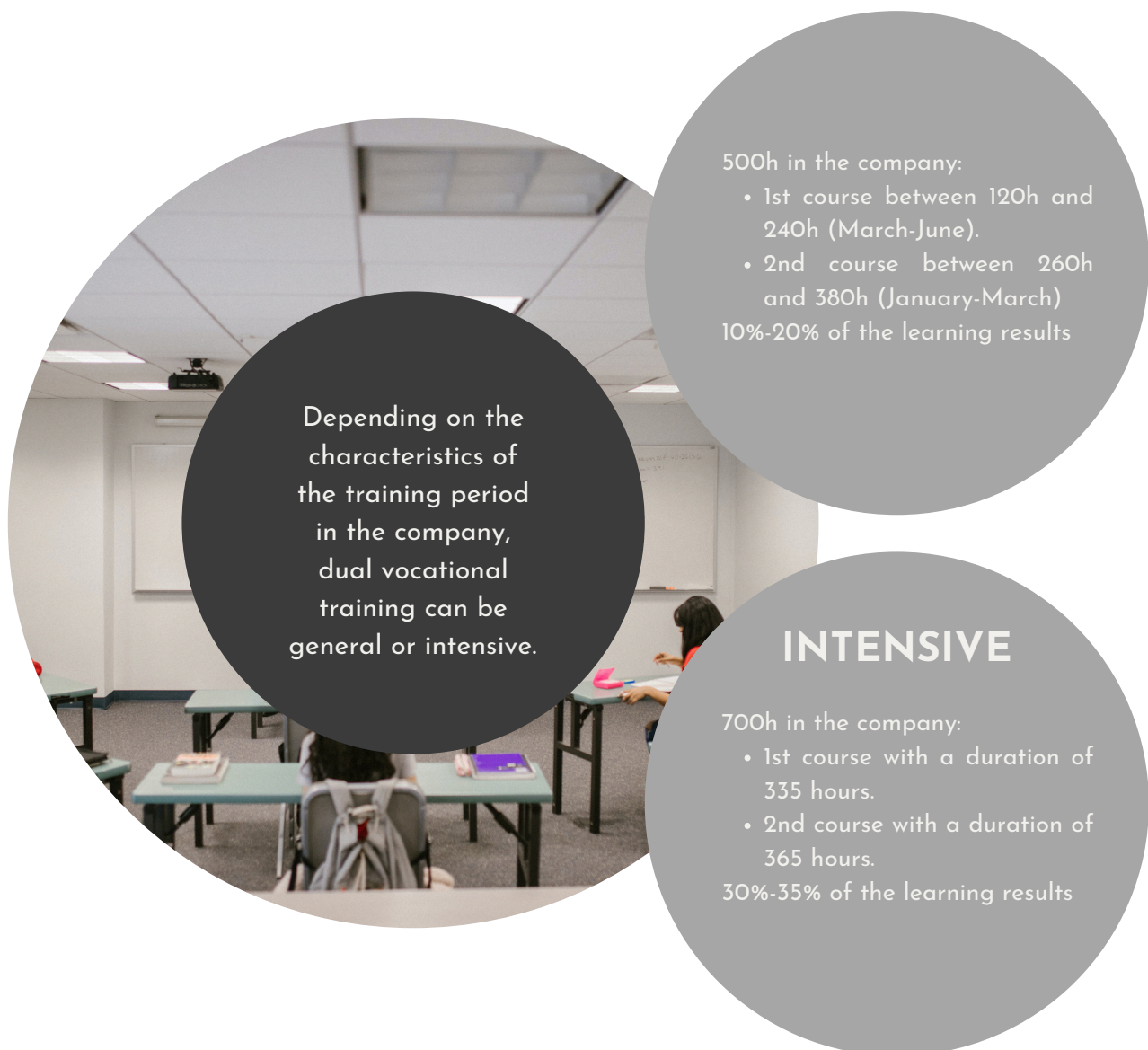
With the new law, all the training offer of GRADES C, D and, where appropriate, E, will have a dual character. In other words, the training cycles will combine training processes in the educational centre and the companies or equivalent organisations. Thus, both entities must contribute to the achievement and acquisition of student learning outcomes.

During the period in the company, the students, who will have both a company and an educational center tutor, will acquire professional skills from their training cycle, will become familiar with the work environment and will acquire key skills for access to the labor market. As for access to training in the company, it will be necessary to be at least 16 years old and to have completed and passed the training in occupational risk prevention.

The purpose of dual training is[6] for students to acquire key competencies, skills and abilities for their access to the labour market. Therefore, the training period in the company or equivalent body aims for students to:

- Acquire professional skills from their training cycle.
- Know the reality of the labor market.
- Participate in the development of an entrepreneurial identity.
- Acquire skills required by the labor market.
- Have a greater capability for their labor insertion.

Depending on the characteristics of the training period in the company (duration, significance of the training and status of the trainee), the dual nature will have two intensities[7]:





METHODOLOGY FOR ADAPTATION TO THE NEW MODEL



Curricular internships in companies have always been considered as an essential complement to the training of vocational training students.

4.1. A main objective: To ensure that the student (all students) gets the most out of their training period in the company and at the same time facilitate the participation of small and medium-sized companies in the new vocational training system

Curricular internships in companies have always been considered as an essential complement to the training of vocational training students. These are a first immersion in the work environment. The student has to adapt to new working methods for him or her, which involve a different degree of discipline and responsibility from what he or she has found in his or her educational center and a way of learning new things that is very different from attending classes, studying teaching manuals or subject notes and facing written exams.



The degree of maturity that is achieved with this experience is highly valued when it comes to finding a job once he or she has graduated. The company where the student carries out his or her internship is asked above all to facilitate his or her integration into a job during the time of the internship and the training related to this position. But in the new model of vocational training, much more is asked of the company. The new regulations reflect the legislator's intention that the training period in the company takes advantage of its working methods to train the student in transversal skills and tools that will serve them throughout their professional career, that is, that facilitate their integration into jobs that will surely be very different from the one in which they have done their internship or adapt to the changes that will occur in the their job as a result of the evolution of society, technology or imposed by the digital, energy and ecological transitions in which we are immersed.

The professional who learned a trade that he/she would practice throughout his/her life with few changes is now a long way off

The professional we are training will surely join a job when they graduate in which a large part of the methods, machines or administrative procedures will be completely new to them and they will have to learn them, but they will also surely change jobs several times throughout their career or even if they stay in the same company for a long time, they will experience very important changes in it each time with more frequently.

Everyone is aware that vocational training curricula must incorporate methodologies that help the student to face these challenges, we could even say that the skills developed in this sense are as important or more important than the volume of knowledge that can be acquired throughout a vocational training degree at any of its levels.

We believe that it is necessary to pave the way for the participation of small and medium-sized enterprises with a proposal for a teaching methodology that is realistic and rewarding for the company.

In this sense goes our methodological proposal that includes a template of the programming notebook and monitoring of the training plan in the student's company. As we will see in the following sections, the aim is to provide students with a template that will guide their training in three different areas: What they need to know to carry out their job, a working method based on critical thinking tools applied to science and technology and the knowledge related to the learning outcomes of their degree for which the company is responsible.



Teaching methodologies in schools move or have to move to help students acquire skills related to autonomous learning, as well as ensuring that they acquire the basic knowledge necessary to allow this autonomous learning, knowledge necessary to understand the new information that may come to them, judge it and take advantage of it to draw conclusions related to their profession and apply them to their activity. In the face of all this, the business environment can have many advantages over the environment of the educational center and the methodology we propose aims to take full advantage of these advantages.

For a change of the magnitude proposed by the new training system to be successful and for dual training to be extended to all vocational training students, a large number of companies will need to be involved. The contribution expected of a company in the new model combines making jobs available to students with a truly educational nature and dedicating the time of the company's staff to tutoring them. It is not easy for small companies to be effectively involved in the process and put in the necessary effort. Much less if, as has been proposed in some regions, self-employed workers from different professions can tutor training periods in the company. In many educational centers it will be a real problem that the companies that currently host students in their curricular internships continue to participate in the new model, much more so to find dual training positions for all their students.

4.2. To help students acquire basic tools for their entire professional life: autonomous learning and critical thinking

As Piaget said in a lecture given in the 60s , *"The main objective of education is to create men and women capable of doing new things and not simply repeating what other generations have done: men and women creators, inventors and discoverers. The second goal of education is to form minds that can be critical, that can verify and not accept everything that is offered to them."* [Jervis 1988]

And he continues *"... The great danger today is slogans, collective opinions, ready-made tendencies of thought. We have to be able to oppose individually, to criticize, to distinguish between what is right and what is not."*



This text is cited in many essays on educational methodologies at any level of education and is or should be of special application to vocational training. We seek to train people who are capable of judging the messages that reach them, inform themselves and evaluate the information they obtain before making decisions, assess the way in which their reasoning has reached certain conclusions to detect if they are being dragged by other people's opinions, generally accepted by their group or that are accepted by the authority of the person who pronounces them. Critical thinking [Paul 2005, Ennis 2011, Pithers 2019, Solano-Martínez 2019] encompasses all aspects of life but we will apply it here to the professional lives of our students.

One way to apply critical thinking to one's professional life is to consider the situations that one encounters in one's workplace as problems that must be solved. It is necessary to be able to state the problem and, consequently, set the objective of the task to be addressed.

Consider



Rationalize



Think



Fact Find



Critical Thinking!

Deepen understandings
and thinking.

Judge



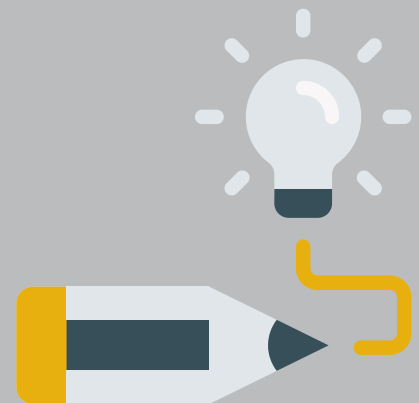
Correct



Analyze



Problem Solve





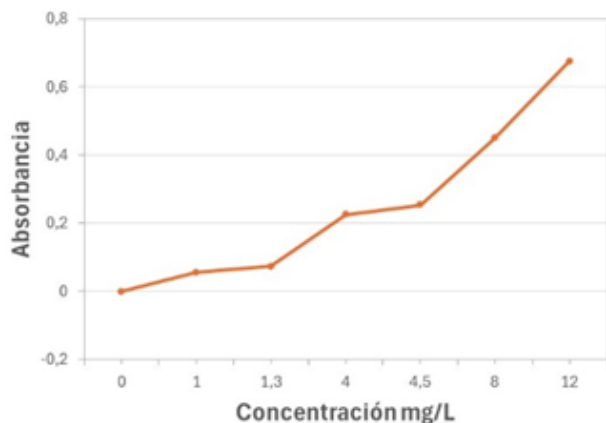
Putting forward a hypothesis is an essential tool of critical thinking and the scientific method, when with what one knows one considers (for oneself) what one should expect as a result of the task one is going to undertake, it prepares the way for a critical analysis of the results that one actually obtains.

If the results obtained do not coincide with expectations, they will force them to think about where their prediction was wrong and will lead them to increase their knowledge, although it is also possible that what happens is that there is an error in the procedure and their critical analysis leads them to detect and correct it. Being interested in this analysis leads to wanting to know in depth the task that is being carried out or the problem that is raised, one of the keys will be to have tools to pose or pose the relevant questions on a topic, and search for information efficiently, assess it and come to understand it to the point of being able to judge if it is correct.

It is not easy today to know how to detect documented information that is erroneous or wrong, to suspect biased judgments and to distinguish well-intentioned opinions from malicious ones. Also in the professional sphere, it will be necessary to learn to distinguish between the different sources of knowledge or technical data, to detect biased information or mere propaganda. Another essential aspect of critical thinking is to communicate effectively with other people both orally and in writing, to accept contrary opinions and analyze them openly and in the same way to have the courage to express and defend one's opinions even when they go against what is commonly accepted or those of people who are recognized as authoritative.

We must accept that what has been expressed in the previous paragraph is extraordinarily difficult for anyone, for an experienced worker or technician or for a secondary school or university teacher, how much more difficult it is for a student at any of the levels of vocational training. Critical thinking is not something innate in people, rather it is quite the opposite. Learning these reasoning tools and attitude takes effort and requires guidance. Teachers at school and tutors in the company or classmates or co-workers themselves have to help the student move forward on this path, but they themselves need to develop critical thinking tools to be able to help.

Let's take an example: A student doing his or her training period in a company that is developing a membrane to remove antibiotics from surface watercourses.



The student has been tasked with performing a calibration line on an ultraviolet spectrophotometer to measure concentrations of an antibiotic in pure water. He or she should prepare antibiotic solutions of known concentrations and measure absorbance for each of them at a given wavelength. When representing the values found, a

straight line should result that will serve to later determine the concentration of a solution that has an unknown amount of antibiotic. The task seems clear. The student must learn the operation of the equipment that serves to prepare the solutions: balances, micropipettes and to make measurements with the spectrophotometer, in addition to the occupational risk prevention procedures related to this task and the protocols for the elimination of waste. The student carefully makes the measurements, with the values found builds a table in a spreadsheet and represents a diagram. The figure shows what he has found.

Concentración mg/L	Absorbancia
0	-0,001
1	0,056
1,3	0,073
4	0,225
4,5	0,253
8	0,450
12	0,675

What do we do with this?

The chief said that a straight line should come out and it does not come out even close to a straight line. Should it be repeated? We want to convince the student to learn to develop working methods that allow him or her to face a technical problem and contribute more than the work of an operator, who performs the task entrusted to him or her in a responsible and effective way, but without analysing the result and, where appropriate, providing solutions. But in order to contribute any idea, it is necessary to have a thorough knowledge of the scientific and technical principles on which the task is based. It won't take much to search on a website for what the UV spectrophotometer is, even just ask ChatGPT. I ask ChatGPT:

Explain to me as if you were a teacher at a vocational training centre and I am a student of an intermediate degree what an ultraviolet spectrophotometer is

ChatGPT answers:

An ultraviolet (UV) spectrophotometer is a device we use to analyze how substances absorb or transmit light within the ultraviolet light range, which is between 200 and 400 nanometers in wavelength. Let's explain it in a simple way:

How does it work?

Imagine you have a substance (it can be a liquid or a solid dissolved in a liquid) and you want to know how it interacts with UV light. The spectrophotometer emits light in this UV range and passes it through the sample. The idea is that the molecules of the substance absorb some of that light, and the amount of light absorbed can tell us a lot about its composition or concentration.

Main Parts:

UV Light Source: Emits light in the ultraviolet range.

Cell or cuvette: Here the sample we want to analyze is placed.

Detector: Measures the amount of light that passes through (or is absorbed by) the sample.

Display or software: Displays results in the form of a graph or numerical values.

What does it measure?

The UV spectrophotometer measures absorbance, which is how much light the sample absorbs at a specific wavelength. The higher the absorbance, the more light the substance has absorbed. This allows us, for example, to know the concentration of a solution. It is very useful for identifying chemical compounds, quality control, or in scientific research.

Simple example:

If you dissolve a substance like vitamin C in water, the spectrophotometer can help you see how it absorbs light in the UV range, and from there, you can determine how much vitamin C is in the solution.

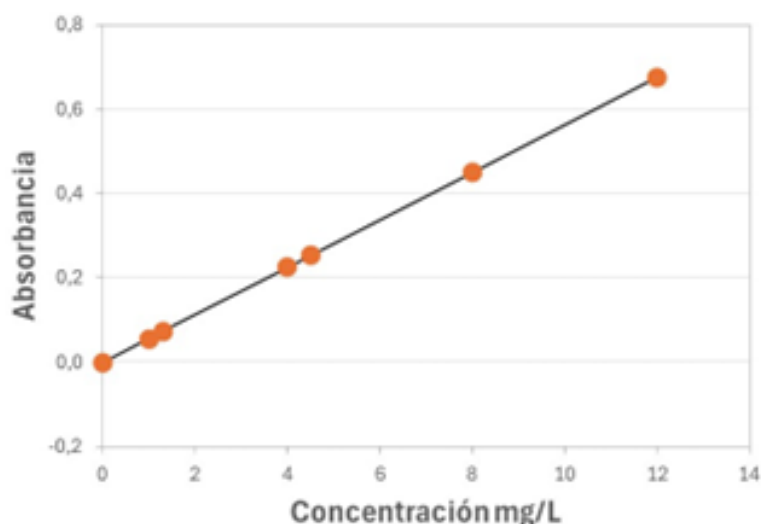
It is a very useful tool in chemistry, biology, and many other fields to analyze materials accurately and without having to alter them.

We have a hypothesis: the result should be a straight line. Could it be that it doesn't really have to be a straight line or that the precision of the measurement is very poor or that the student has made a mistake in preparing the solutions? But the measurements have been made in triplicate and what is represented is an average value

The other part of the work has been the graphical representation of the data. The Spreadsheet has presented the graph as follows. We will have to study a little more how the Spreadsheet makes the representation. Perhaps here the easiest thing for the student is to ask co-workers, the tutor or a teacher at their school. They can also dive into the application's menus or go to a tutorial on graphical representation in Spreadsheet.



In this case there lay the problem, the type of graph was poorly chosen (it was a line diagram that on the axis of abscisses represents texts and therefore the numerical values are separated equally, not according to their value. Choosing an x/y scatter plot instead of the line diagram is the diagram in Figure 2. This is something else.



Our methodology aims to guide the work of the student during his or her training in the company in this line. It is clear that an additional effort is needed to do the task as it is asked of us and let others judge the result and draw conclusions. But we are going to try to convince them that it is an effort that is worth it because of what they learn concretely about what they are doing, but above all because they learn a way of learning that will serve them throughout their professional life. As we said before, the student will need to be helped to acquire the necessary tools for autonomous learning and critical thinking. We intend our training plan programming and monitoring notebook template to be a help for both the student and their tutors on this path.

Perhaps the teachers in the educational center find it interesting to adapt an analogous method to the teaching of their subjects or perhaps they already do. Students who during the first year of their vocational training degree have developed an internship in companies following these procedures hope that they will have more tools to study the subjects of the following year.

4.3. The training plan programming and monitoring notebook

When the student begins the training period in the company, he or she will be given a notebook in the form of a digital document containing a template that must be completed throughout his or her stay in the company, which we include as Annex 1 at the end of this text.

Programming and monitoring notebook of the training plan

Student:

Educational center:

Technology company:

Training start date:

This document will be hosted on a company server, in a shared folder to which the student, his/her tutor in the company and, if so agreed, the tutor in the educational center will have access at all times. As we will see, the notebook itself can be a very useful tool to facilitate the evaluation of the student who, according to the legislation, corresponds to the educational center. The student is presented with a series of conceptual questions and exercises. He or she will need to search for information and assimilate it to answer the questions that are posed. The results of the tasks carried out in the company are also collected in the notebook on which a critical analysis is requested.

An essential aspect of the methodology we propose is that, although the questions posed to the student must be prepared from the outset, the tutor can change or adapt them to the progress he or she sees in the student's work, the training plan is not only individualized, but can be dynamically adapted to the characteristics of the student to get the most out of the training period in the company. Special attention should be paid to monitoring progress in learning with students with obstacles.

Part 1

It has a first part, PART 1, which includes the learning results that must be acquired during this period in addition to the data of the student himself/herself, his/her tutor in the company and his/her tutor in the training center. These learning outcomes will be agreed between the company and the educational centre as specified in Organic Law 3/2022 on the organisation and integration of vocational training [BOE 2022]. The way in which the student is guided in their learning allows a certain flexibility when it comes to choosing the learning outcomes for which the company is responsible. The curricula of vocational training qualifications contain a series of modules, each with broad content. It is difficult for a company's activity, especially if it is small or medium-sized, to fit well with one of these modules or even fit with the entire content of a learning outcome.

PART 1		TRAINING PLAN	
Course		Company	
Training degree/specialization course/professional certificate			
Student		Email:	Telephone
Training Center		Email:	
Tutor at the training center		Email:	Telephone
Tutor in the company		Email:	Telephone
Particular features			
In company training period	Calendar/Schedule/Period		
Total hours			
Learning outcomes in in-house training periods			
Professional Module	Code	Learning Outcomes	Activities
		Lo1	
		Lo 2	
		Lo 3	
Signed: Tutor in the company	Signed: Student	Signed: Tutor at the training center	

However, it is likely that the company has technicians capable of guiding the student to acquire a complete learning outcome using this methodology. As an example, if a company is engaged in the formulation of plastic pellets using extruders and pelletizers, it will be able to teach a lot about the raw materials it uses, the additives and the manufacturing processes it uses, but with respect to a learning outcome that has to do with the molding of plastics and metals, it might be thought that it should only be responsible for a relatively small part of that result. We do not think that this is the case, we believe that the company can take care of all or a good part of this learning outcome as we will see when we present PART 4 of the notebook.

It is clear that the teacher of the educational center can greatly help the company to design its part of the student's training plan. The legislation emphasises that this training plan is personalised and the previous knowledge that the centre has of its students must help with this personalisation.



It is not that we believe that the way in which the student has related to his or her previous studies has to be very decisive, rather we believe that the key is that the program that is designed is very flexible and can be easily adapted to the way in which the work that the student does in the company and his or her integration into the work teams is developed.

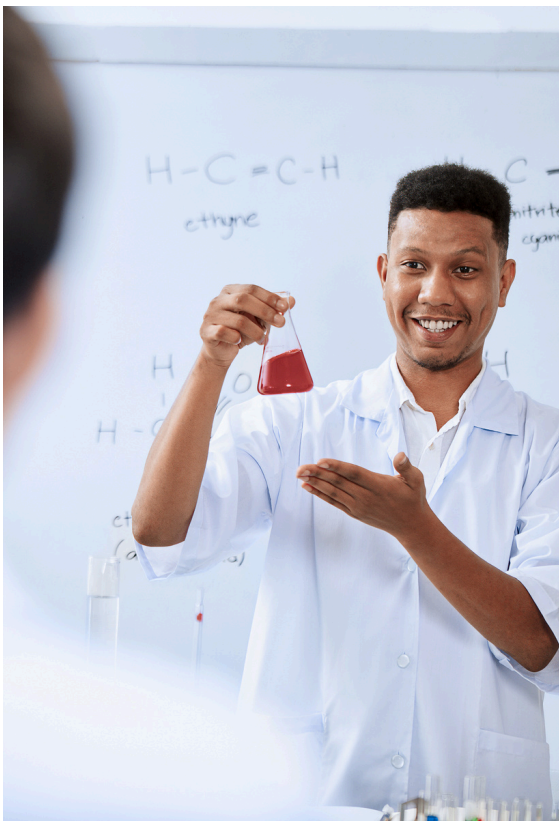
It is to be expected that, at least at the beginning, the company technicians who are going to be in charge of the students' internships are largely unaware of the study programs of the degree, the modules that make it up, the expected learning outcomes and the guides for the evaluation of the students. The teachers of the center will also be of great help when it comes to providing information in these aspects.

Combining the organisation of teaching in the educational centre with those of student internships in companies is sure to be very complicated. It is to be assumed that in many centers it will be chosen that the internship period occupies the same months of the course for all students, but if each company chooses to take care of different learning outcomes, adapted to its activity and business plan, this implies that the educational center is also responsible for different results for each student.

Even if they only involve a limited number of learning outcomes specific to the degree, how can classroom teaching be organised under these conditions?

The educational center will surely be interested in there being a certain uniformity in the agreements with companies for the students of the same classroom. That would make things much easier. We return to the importance of designing a methodology for in-company training that allows for content that, although it does not fit directly into the company's activity, the company's tutors can guide the student in their learning.

Of course, the fact that the teachers of the center provide the teaching materials that they use in the teaching of these subjects will be of great help. The teachers of the center can also transfer the experience of teaching practice from one company to another.



Part 2

PART 2 is aimed at training the student in the job in which he or she will carry out his or her internship. As we said before, our objective is for the student to be interested in knowing in depth not only the protocols that he or she has to follow in his or her work but also the scientific or technical principles behind these procedures, the objectives of the tasks he or she performs and that he or she becomes able to judge for himself or herself if the results obtained are valid. It is clear that the way in which the student is going to acquire this knowledge and skills is going to be very different from how they have been doing in the educational center. They should not expect to have a teacher explaining the subject to them (although they will have a tutor and co-workers to ask specific questions) nor will they have written notes in which to study one topic after another.



In the following figures we present the appearance of the model pages of this PART 2 in the programming and monitoring notebook of the training plan. Our proposal to guide the student in this learning is based on posing an orderly series of questions divided into three chapters: Conceptual questions, Questions about technical information, and Questions about the presentation of results and their analysis.

Probably, a large part of the success of this method lies in adapting the degree of difficulty of these issues not only to each level of vocational studies but to each specific student. Questions that encourage them to seek information and understand it, to draw conclusions from it and to want to know in greater depth what is behind the work they do. But, on the other hand, it must be questions that do not pose such a high barrier that they discourage them almost before they start.

Undoubtedly, the teaching experience of the teachers at the school can help companies a lot when designing this battery of questions. The way in which we approach it allows, on the other hand, to readapt the training plan to the progress of the student.

The notebook has a digital format. The idea is that it is hosted on a company server, it is filled in online and that both the student and the tutor in the company have access to it and it depends on each company could remember that the tutor of the center also has access to its content. The tutor can see how the student is progressing and change the questions raised that have not yet been resolved for simpler or more complex ones according to what each student requires.

Answering these questions requires seeking information and understanding it. The student will need help for this, especially at the beginning and especially in intermediate vocational training degrees. Earlier we showed an example of the possibilities provided by tools that use Artificial Intelligence to adapt not only the information but also the language in which it is expressed to the desired level. It is also necessary to highlight the dangers it has in terms of giving wrong or imprecise answers to the questions asked if they are very specific. But, in any case, it is worth thinking of these applications as a teaching tool of great flexibility and incorporating it into our methods. Of course, we have other classic methods that can be exploited effectively. The company may have some manuals, or books, or technical documents, that it can show to the student. It is very interesting for students to learn how to deal with this type of technical documentation. They can also search on the internet, but they only have to go on the internet with a specific question to see that for an intermediate degree student it will be very difficult to extract from what appears what he or she is able to understand and will find useful.



In these sections we attach great importance to the training of the student in written expression. There are direct questions that ask he or she to write a written answer in a concise way:

Explain in 3 or 4 lines what you mean by..... or why does it happen that...? Or how is xxxx different from yyyy?

The tutor can access the student's answers and add notes asking to correct sentences or indicating if it is expected that the reader understands what is meant, in addition, of course, to point out conceptual errors and add text with additional explanations. In the same way that we support the use of applications that use artificial intelligence such as ChatGPT as a tool for learning, we see that students must be convinced not to use it as a way to save themselves the work of writing answers. The exercise of explaining a concept to another or the response to an exercise makes see to what extent understand well what you are explaining. The student can be made to see that the exercise that is proposed is a way of acquiring that capability for expression. In fact, later on we will propose that the evaluation include brief oral explanations of very general issues, such as the objective of the work they have done in the company, the application of what they have done or produced, etc.

PART 2.- Workplace. Overview		
Task Title:	Folder/Server:	Date:
Short 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 pages as needed</i>		

PART 2.- Workplace. Conceptual issues.	
Explain the concepts clearly and concisely and solve the exercises collected in the following cells.	
Question 1. Explain in 4 or 5 lines what you mean by...	
Question 2. Why does it happen that...?	
Question 3. How is xxxx different from yyyy?	
Question 4. Mark the correct answer to the following questions among the 4 options that are posed:	
.....	
Bibliographic search: <i>Include in this cell the reference where you have studied these concepts, it can be a website or a chapter of a textbook or some notes from a subject of your training center.</i>	Think and write very briefly how you have decided on one type of bibliographic source or another

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

PART 2.- Workplace. Processing and storage and presentation of results.	
Do the following exercises.	
Exercise 1. Plot the following data...	
Exercise 2. Perform the following operations on your server folders....	
Exercise 3. Data operations.	
Exercise 4. Mark the correct answer to the following questions among the 4 options that are posed:	
.....	
Bibliographic search: <i>Include in this cell the reference where you have studied these concepts, it can be a website or a chapter of a textbook or some notes from a subject of your training center.</i>	Think and write very briefly how you have decided on one type of bibliographic source or another

FIGURES 1, 2, 3, 4 TEMPLATE FOR PART 2 OF THE TRAINING PLAN PROGRAMMING AND MONITORING NOTEBOOK.

Part 3

PART 3 of the notebook is where the student will collect all the results of the tasks they perform in their workplace. We include a review of this part in the guide to show its fit in the teaching methodology we propose. The template of these pages of the notebook is intended to be a guide for the student to approach their work with critical thinking tools. Each of the tasks will be collected on separate sheets.



As in all the rest of the notebook, the tutor or other staff of the company will explain to the student the task to be carried out, it will be the student who writes in the notebook the fundamental aspects of this explanation. We ask them to write in a few lines the objective of their task, how useful the task they have been entrusted has for the company. Next, we ask them for a hypothesis, that is, to anticipate the result they are going to obtain. It is not easy for a student at any level of vocational training to do this exercise.

It requires a good understanding of what they are going to do. Let's imagine an example: The student is asked to prepare gelatin microspheres with an emulsion process in oil. The gelatin dissolved in water is allowed to drip into a stirred reactor containing a set amount of vegetable oil. The stirrer is magnetic and spins a magnetized rod coated with Teflon® at a certain speed. Once the emulsion has been established, which consists of a dispersion of drops of the gelatin solution in the oil, a coagulant is added that gels them, making each of these drops become a microsphere of gel, already insoluble in water. The microspheres are then washed to remove the oil and dispersed in water or alcohol, and the size distribution is measured by image analysis from photographs taken using optical microscopy. He or she will repeat the procedure with several stirring speeds. In the first point, we ask the student not to be satisfied with following the procedure, to ask questions and be able to write what the company wants these microspheres for. They may not give the students many details, but surely they do give them a general indication, for example, they are used to load them with a drug that is then progressively released when the microspheres are transplanted into the body. This may lead him to become interested in this technology.

Then, we ask he or she to think about how big those microspheres are going to come out. How difficult is a question like this: will they be 1 micron, 10 microns, 100 microns or 1 mm in diameter on average? Will they all come out the same or will there be some small and some big? He or she will have to ask one or the other to have a preliminary idea, they may tell them when they do it shaking at 500 revolutions per minute (rpm) most of them come out between 30 and 100 microns in diameter. And if the stirring speed is increased, do they come out bigger or smaller? With little effort, the student can get an idea of what outcome to expect.

Next, it is important that the student write down the procedure so that he or she is sure that has understood each step, that the student knows how to handle the equipment and also that knows all the details related to the prevention of occupational risks, that consults the safety sheets of the substances he or she is going to use, that knows the personal protective equipment that has to use... in short, that he/she has received all the necessary training for his job and that he is able to write what is necessary in the notebook. Naturally, the student will not have to write all these aspects, in many cases it will be enough to indicate, for example: the safety sheet of the product xxx are in the company's yyy file.

Those who give the job training must be aware that this contact with the task requires the student to dedicate time to it.



The notebook has a section to write down the experimental results, in many cases it may be easier to take notes on paper in a conventional notebook and if so, it may be enough to photograph those pages and include the images in the digital notebook, it can also include other files exported directly from the equipment: videos, graphic representations, etc. The student will learn to collect his or her notes so that they can be used by other people and do so effectively. Then the analysis of the data will be carried out, in our example photographs are taken under the microscope and analyzed with a computer program that automatically gives a size distribution. The template includes a box for the evaluation of the results by the student himself. Here, it will naturally be contrasted with the hypothesis raised. It was said that at 500 rpm microspheres of between 30 and 100 microns would come out. If the result is very different, for example, that some of the microspheres are very large or very small, it forces us to consider whether the hypothesis was wrong or if something in the experiment has failed and look for the reason. Finally, a few lines of conclusion are requested. Again, this takes time that is expected to be more than compensated by the formative role for the student and as a consequence for his or her performance in the company.

Other types of activity will need different approaches, but possibly the practices that involve students can follow a scheme analogous to that of our example in many production processes.

PART 3.- Activities. Task 01		
<i>(any tasks will be added as needed)</i>		
Task Title:	Folder/server *:	Date:
Short Description		
The problem that arises.		
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 pages as needed</i>		

PART 3.- Results of task 01		
Title:	Folder/server *:	Date:
Additional information obtained during the performance of the task: Alternative test methodologies, sources in which to compare the data obtained, etc. Include the related files as annexes in the folder, indicating here the name or reference of the file.		
Experimental protocol (if there is already a written protocol in the company, simply indicate 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 taken by hand or printed by the team, can be photocopied or scanned and copied here as an image. Videos, photographic images and other material will be added as attachments to the working folder, with the name or reference of the file here.)		
Add as many pages as needed, copying the entire table		

PART 3.- Analysis of the results of task 01		
Title:	Folder/server *:	Date:
Assessment of the result: Assess the reproducibility of the trial, 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 supervisor or other team members		
Conclusions (here the solution to the problem posed must be proposed, but also detailed conclusions about the task itself, about the experimental procedure, suggestions for new tests, etc.)		

FIGURES 5, 6, 7, 8. TEMPLATE FOR PART 3 OF THE TRAINING PLAN PROGRAMMING AND MONITORING NOTEBOOK.

Part 4

PART 4 of the workbook is dedicated to the specific learning outcomes of the degree that the company is responsible for. Our proposal is to follow the same methodology as in PART 2, that is, to ask the student a series of questions that guide them in their study and make them advance in the acquisition of the tools of autonomous learning. The template of the training plan programming and monitoring notebook includes different types of questions (Figure XX). Naturally, the student will need help for this. The greatest difficulty that a student encounters when studying is possibly finding information appropriate to their level of studies. Surely the teachers of the educational center will be able to help the tutors in the company with their experience in teaching in the degree and with the materials used by the students. It is also not easy to organize information and study in an orderly way if they don't have a manual or a textbook that contains the entire training module.

PART 4.- Training content	
Explain the concepts clearly and concisely and solve the exercises collected in the following cells. The questions are sorted by topics related to the training outcomes we hope to achieve during your time at the company. Before you start writing, you'll need to look up information about the topic and study that information.	
Topic 01 (Module xxxxxxxxx learning outcome RA01)	<p>Bibliographic 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></p> <p>Think and write very briefly how you have decided on one type of bibliographic source or another</p>
Conceptual question: Explain in 4 or 5 lines what you mean by...	
Conceptual question: How is xxxx different from yyyy?	
Conceptual question: Build a table with the following material properties...	
Mark the correct answer to the following questions among the 4 options that are posed:	
Problem: Calculate...	
Characterization protocols: Look for the test standard... and briefly explains the shape and preparation of the test specimens and the magnitudes that are measured.	
Technical Information Search: Find the value of.... (e.g., of the electrical conductivity of copper)	
<i>To program this part of the training plan, it is suggested to include one topic per learning outcome. The concepts and exercises admit enormous variability, the types of content of the question and exercise cells are just a few examples of the types of questions that can be raised.</i>	

FIGURES 9, 10. TEMPLATE FOR PART 4 OF THE TRAINING PLAN PROGRAMMING AND MONITORING NOTEBOOK.

Example

Let's go back to an example related to a student's internship in a company that is related to the additive manufacturing of plastic parts. The student is studying the title of Technician in Forming by Molding of Metals and Polymers, of intermediate level. The company has agreed with the educational center to take responsibility for the learning outcomes related to the professional module of "Preparation of raw materials".

Within this module, the following learning outcomes are collected:

- It characterizes the influence of metal raw materials in the process of obtaining parts by molding, relating their characteristics to the manufacturing parameters.
- It characterizes the influence of polymeric raw materials and additives in the process of obtaining parts by molding, relating their characteristics to the manufacturing parameters.
- It obtains polymer mixtures, analyzing the order of incorporation of the products.
- Carry out storage operations of raw materials and finished products, relating the conditions of use and conservation with their characteristics.

It may be interesting for the student to have the company take care of the set of learning outcomes of a training module. In this case, learning outcomes 2, 3 and 4 are related to a greater or lesser extent to the company's activity and the experience of its technicians, learning outcome 1 may be more distant from them. What we propose is to write a series of questions that allow us to cover the basic contents. The pedagogical guidelines and evaluation criteria set out in the Royal Decree that defines the degree can serve as a guide for this, but the experience of the teachers of the educational center can be of invaluable help.

Thus, for example, related to learning outcome 2, the Royal Decree sets out a series of basic contents and we can pose a question for each of them that guides the student. We do not believe that the objective is to make the student make their own manual of the subject, but to ask them some questions with which we think they will learn what we think is necessary for their degree. For example, in the section on the basic contents of the module Identifying the influence of polymers on transformation processes.

The heading is included:

- *Polymeric materials: thermosets, thermoplastics and elastomers.*

And we could ask the student some of these questions

- Write down in a few lines the difference between a thermoplastic polymer and a thermoset polymer.
- What is the essential characteristic to say that a polymer is a thermoplastic?
- When hanging a weight from a bar, will it deform more if it is made with an elastomer or if it is made with a thermoplastic?
- Can you produce a part of an epoxy resin using injection molding? If the answer is no, how would you do it?
- Is polycarbonate a thermoplastic, a thermoset, or an elastomer?
- In almost all classifications there are elements that do not fit well in any of the categories. Look up what a thermoplastic rubber is. You'll see that it's both a thermoplastic and an elastomer.
- How would you classify the polymer with which soft contact lenses are made?

We are convinced that the path that the student will take to answer a couple of these questions (no more) will make him or her have a clear idea of the properties that identify and differentiate thermosets, thermoplastics and elastomers. Compared to the more conventional way of learning these concepts, which could consist of reading and memorizing half a page of a manual, our method may take a little more time, especially at the beginning, but the result will be more permanent.

Above all, if in the future, perhaps in a few years, they need to handle these concepts and do not remember them, they will have training that will allow them to look for information again and refresh it with very little effort.

Something similar can be said for each of the headings included in the Royal Decree in this section.

Thus, in the heading

- *Environmental, mechanical, physical, optical and electrical properties of polymers.*

We could ask a thousand questions, in the same way that there are books that dedicate hundreds of pages to this point, but it is not necessary or convenient to expect the student to exhaustively study all the properties of polymers, especially when those of some polymers are extraordinarily different from others. It is better to focus on the meaning of each property and the way to look for values for a specific case.

And we could ask the student some of these questions

- Write an equation that defines the Young's modulus or elastic modulus of a material.
- We have a polycarbonate bar that is 100 mm long and 1 x 2 mm cross-section. What would be its final length if we hung a weight of 10kg?
- How would you define a brittle fracture? Give an example of a polymer that breaks in this way. In any case, the most common thing in polymers is that they break due to excessive deformation, write in a couple of lines what this means.
- Polymers have viscoelastic behavior. How would you describe in a couple of lines what this behavior means?
- The vast majority of polymers are good electrical insulators, what property characterizes the suitability as an electrical insulator? Look for the value of that property for low-density polyethylene and for polyvinyl chloride, PVC.
- Does a solid piece of polystyrene float? Does a piece of expanded polystyrene float? why?

A few more examples: in relation to the

- *Influence of temperature on final properties.*

We could propose

- We have a mold consisting of a closed cylinder with a plunger. We have filled it with polystyrene in the form of pellets (polymer grains with a size of about 3mm) at room temperature and we have placed it in a press that exerts very high pressure on the plunger. Explain in a few lines what happens when we increase the temperature little by little to 200°C.
- You have a piece made with an epoxy resin. It is rigid at room temperature. Will it soften if we increase the temperature, let's say up to 120°C. What will happen if we raise the temperature much higher, up to 250°C?
- The same as the previous question but for polystyrene.

And so we would continue for the different sections that define the entire module. It is necessary to make an evaluation of the volume of work that the student entails as he or she advances in the study and be willing to reformulate the questions initially posed based on the characteristics of each student. The reference should be the number of hours planned in the degree for teaching dedicated to these learning outcomes.

Part 5

Finally, the notebook has a self-assessment section so that, following the assessment criteria set for the degree, the student is aware of whether the exercises they have been doing have made them learn what is asked of them. It is also important for the company to have this feedback to adapt the questions and exercises raised throughout the training period in the company.

PART 5.- Self-assessment	
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 sufficient for you to master each of these aspects. Enter a comment to this effect in the box on the right.	
Evaluation criterion CA1	
CA2	
CA3	
.....	

FIGURE 11 TEMPLATE OF PART 5 OF THE TRAINING PLAN PROGRAMMING AND MONITORING NOTEBOOK.



ADAPTATION PROCESSES OF THE NEW MODEL



The adoption of the new VET model implies a series of changes in the pedagogical and organisational approach of schools. The following are the main steps that schools must follow to adapt to this model, guaranteeing quality training and adjusted to new demands.

a

Evaluation of the educational offer

The first step that a VET centre must take is to carry out a thorough evaluation of the current training offer. This involves reviewing curricula and analysing which skills are most in demand in the labour market. Changes in vocational training seek greater alignment with the work environment, so it is essential to establish a dialogue with companies to learn about their needs. To do this, it is advisable to:

- **Conduct surveys or meetings with local companies** that collaborate with the centre.
- **Analyse labour market reports** related to the specialisations offered at the centre.
- **Identify the key competences** that require further integration into the training curriculum.
- **Involve the educational administration** so that it is aware of the training cycles that it must promote according to the demand of the labour market.
- **Identify areas for improvement in training content** and update it to align it with current and future market needs.
- **Apply quality and satisfaction indicators** to measure the impact of training on the employability of students.
- **To monitor graduates** to evaluate their labor insertion and professional career.

b

Curriculum review and update

Once the priority competencies have been identified, it is necessary to carry out a revision of the curriculum. The new VET model places greater emphasis on project-based learning and real-world situations, so it is recommended:

- **Incorporate active methodologies** such as project-based learning (PBL) or collaborative learning.
- **Encourage the use of simulators or virtual environments** that allow students to practice specific skills before facing real situations in the company.

- **Establish a sequencing of competencies** that allows a natural progression between theoretical and practical learning.
- **Flexibility in Curriculum:** Allowing students to choose projects or modules that align with their interests and career goals.
- **Use of Digital Technologies:** integrating digital tools and online learning platforms to complement face-to-face training. In addition to promoting the use of software that is used in the work environment.
- **Enhance the critical character of students:** above all, we train people within a specific social and cultural environment.



Strengthening the relationship with companies

The new VET model proposes a greater integration of companies in the training process. To do this, it is necessary to establish a fluid relationship between the educational centre and companies, which goes beyond the simple offer of internship places. Some key actions can be:

- **Create stable collaboration agreements with companies** in the technology and industrial sector.
- **Participate in the creation of training plans together with companies,** to ensure that the skills taught in the centre coincide with the real needs of the work environment.
- **Develop a "collaborating company" model,** where the company actively participates in the continuous training of students through talks, seminars or mentoring.

d

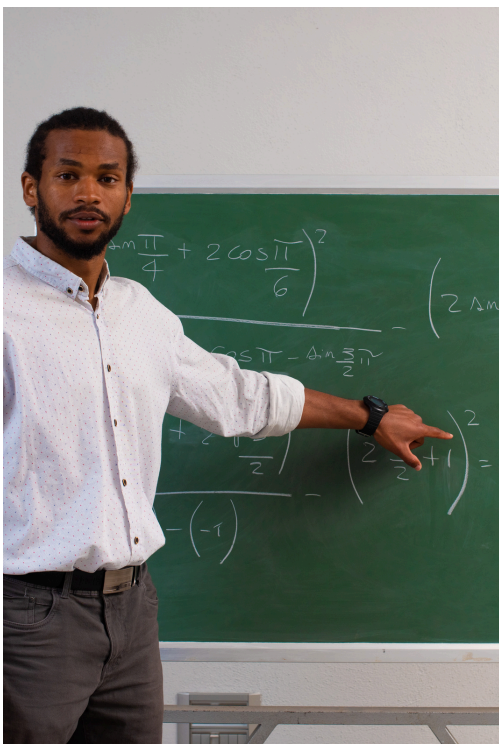
Curricular and schedule flexibility

The greater inclusion of work mobility period in companies requires greater flexibility in academic schedules and calendars. The centres must adapt the training times according to the needs of the collaborating companies and the demands of each specialty. This involves:

- **Adapt educational center schedules**, allowing students to combine their training at the center with company training.
- **Restructure the evaluation periods**, adjusting the qualification moments to the reality of in-company training.
- **Explore the possibility offered by a more individualized curricular adaptation.**
- **With the implementation of the law, teachers will take a more active role in monitoring** and mentoring students during their stays in companies, which implies greater coordination and communication with company tutors.



THE ROLE OF THE TUTOR OF THE EDUCATIONAL CENTER



The tutor in the new VET model plays a crucial role as a liaison figure between the educational centre, the company and the student. The responsibilities of the tutor have undergone a significant change, adapting to a new reality that is more collaborative and oriented towards the personalized monitoring of the student.

a

Comparing with the Previous Model

In the previous VET model, the centre's tutor was mainly responsible for coordinating the internships and monitoring the student's professional module of Training in Workplaces (FCT). An aspect focused on the bureaucracy involved in planning on the SAÓ platform, the student's training program, their attendance and correct integration into the work environment. Not forgetting those circumstantial issues that the tutorial action entails.

However, with the new model, the tutor's functions are significantly expanded. Some of the main differences are:

- **Greater involvement in the design of the student's individualised training plan**, in collaboration with the company.
- **Active coordination with the company tutor**, sharing the responsibility for monitoring the student's progress in in-company training.
- **Supervision of the acquisition of competencies**, not only in terms of technical knowledge, but also of transversal skills, such as teamwork skills, initiative and problem-solving.

b

Responsibilities of the tutor in the new model

With the greater integration between the educational center and the company, the responsibilities of the tutor are focused on:

- **Design and adjust the student's training plan:** The tutor must define, together with the company tutor, a learning itinerary that guarantees the acquisition of the necessary skills. This pathway may require adjustments based on the student's progress. It is also very important that the tutor offers synergies with the rest of the teachers in the educational team. It should be borne in mind that, in this new VET model, each of the teachers are evaluators of the learning outcomes of their professional module in the company. Therefore, the tutorial action in the new Vocational Training Law requires an exhaustive involvement of all teachers of the different training cycles.

- **Evaluate the student's performance:** The tutor must carry out constant monitoring, not only through visits to the place of the training in the company, but also through the use of technological tools that allow regular contact with the tutor of the company.
- **Facilitate the student's adaptation to the work environment:** In the new VET model, the tutor must accompany the student in their process of adapting to the company's corporate culture, guiding them in the development of interpersonal and work skills.
- **Encourage reflective learning:** It is important for the tutor to promote the student's self-assessment, inviting them to reflect on their practical experience and identify areas where they need to improve.
- **Guidance and support for the student:** the tutor must help to integrate the content taught in the educational centre with the training in the company. In addition, it must assist them in solving problems and adapting to the work environment.
- **Coordination with the Company Tutor:** they must also maintain constant and fluid communication with the company tutor to ensure that the training program is fulfilled and that the training in the company is carried out properly. This can be done, among other actions, by participating in periodic meetings to evaluate the student's progress and adjust the training programs as necessary.



METHODS FOR READJUSTING THE TEACHING LOAD TO TRAINING PERIOD IN THE COMPANY



The increase in the time spent on in-company training in the new VET model requires teachers to readjust their teaching load effectively. Here are some suggested steps to achieve an appropriate balance between classroom teaching and adherence to training periods in the company.

a

Distribution of internships throughout the training cycle

With the new regulations, in-company training will be carried out between the first and second year, which requires a readjustment of the content and practices taught in the classroom. Teachers must:

- **Identify the key contents that should be taught in the first year**, prioritizing those that students will need during their first internships.
- **Adapt the contents of the second year** so that they serve as a complement and reinforcement to the training experiences that the students have had. This may involve the elimination or restructuring of less relevant topics.
- **Review and redesign the curriculum** to ensure that content and training period are balanced and aligned with the new demands.
- **Training and professional updating**: teachers must participate in continuous training programmes to be up to date with the new methodologies and technologies applicable to their field of training, including updating in digital skills and innovative teaching techniques.

b

Coordination between teachers and company tutors

The monitoring of the student in in-company training cannot fall solely on the tutor. The new Vocational Training Law indicates that it is mandatory for teachers who teach professional modules that are associated with units of competence to actively participate in this process. To facilitate this coordination:

- **Increase and distribute the monitoring load** among several teachers, especially in cycles where students specialize in different technological areas.
- **Use digital platforms for follow-up**: There are tools that allow teachers and company tutors to record and monitor the student's progress in real time, facilitating quick and effective feedback. The current monitoring platform has become somewhat obsolete.

- **Integrating the figure of the prospector:** It must be integrated in a real way, acting as a coordinator and identifying opportunities for collaboration between companies and educational centers.
- **Hold periodic meetings:** this way you can see the progress or possible problems that the students are encountering.
- **Evaluation and feedback:** before, during and at the end of the internship period, all the elements involved will provide their opinion that will be valuable for future adjustments.



Reducing the Assessment Load in the Classroom

With a greater weight of in-company training, the evaluation criteria in the classroom must also be adjusted. Some recommendations to reduce the theoretical evaluation load are:

- **Increase the weight of practical projects in the overall evaluation,** thus integrating the learning acquired in the company.
- **Use continuous assessment systems,** where students demonstrate their progress gradually and less dependent on final exams.
- **Reduce the use of written exams:** this type of conventional assessment can produce, due to various factors of the moment, that the results are indicators of the student's evolution.
- **Use of Digital Tools:** these tools can automate part of the evaluation process, reducing the administrative burden for teachers and being able to use this time in more practical activities.
- **Competency-Based Assessment:** if we focus on competency-based assessment, assessing practical skills and applied knowledge rather than just theory, we can obtain more representative



PROMOTING DUAL PROCESSES IN THE CLASSROOM THROUGH DIGITALIZATION



Digital tools can be an invaluable help in the interconnection between schools and companies, especially at the European level.

Digital tools can be an invaluable help in the interconnection between schools and companies, especially at the European level.

There are very interesting experiences within the framework of the Erasmus + programme that allow the interaction of educational centres and companies from other countries when the economic means are not sufficient for a student to move to another country for a more or less long stay. They can take advantage of the teleworking methods developed in many companies, especially during and since the COVID-19 pandemic.

We can advance some ideas in this regard:

8.1. Classroom development projects proposed and directed remotely by company staff

In this type of project, the company proposes and plans the development of a realistic project that the students will carry out in the classroom under the remote supervision by digital means of a technician from the company and the supervision in the classroom of their teacher. One of the objectives of these projects has been to motivate students to engage in vocational training at the beginning of their studies. Pilot experiences have shown that carrying out an internship that, for example, involves the design of a product or equipment and planning its production is highly motivating for the student with a view to their subsequent studies until graduation[8].

→ An initial experience in a work environment

It is very favourable to carry out the experience at the beginning of intermediate or higher level vocational training studies. In this way, the motivating nature of the experience is reinforced, which can also have an effect on the student's attitude when focusing on the study of the subjects of their degree.

→ A creative work

We consider it important that the work that is proposed to be carried out in the classroom, even if it is necessarily limited, is a creative and realistic work that is related to the business plan of the company that proposes and directs it.

→ Show talent

The distribution of tasks among groups of small students that allows each student to show themselves and the other members of the group their talent

A satisfying experience

Work planning is very important. Surely the training in company will have a limited duration that allows it to fit into the curriculum and despite this there must be time to achieve results.

To promote a positive relationship between students and with their teachers and people in the world of work

Group work with precisely marked practical objectives and the need to communicate the progress of the work periodically establishes a very interesting dynamic in the classroom.

A project posed as a challenge for the classroom as a whole

With what this can mean in terms of awareness of belonging to a group and co-responsibility.

Learning teleworking techniques

Students will face the use of digital communication and teleworking tools: telematic meetings with the company's tutor and the use of the software required to carry out the project.

Relationship with a foreign company

Internships in a virtual environment allow the application of these methodologies to be extended to the European framework, in an educational center of one country an internship proposed by a company of another country can be carried out. Students will immediately see the possibilities that developing language skills will open up to them, as well as providing them with a broad vision of the world in which their professional career will develop.

8.2. Virtual internships in companies

The development of virtual internships aims to take advantage of the possibilities of teleworking in the company for the training of students. There is a wide range of company activities that can be carried out remotely and that, in fact, are already being carried out in this way. Companies have developed highly experienced methodologies for this purpose. For a student, training in these methodologies can be very important for their professional career. On the other hand, carrying out virtual internships can cover a large part of the objectives of an internship in the workplace and open up the possibilities of carrying out internships in companies that are of interest to a student but that are not in the environment of their educational center. The inequality in the development of the industrial fabric in different regions of Europe and within each of its countries is transferred to the possibilities of students to have access to training in the workplace in the sector that is of interest to them. The economic resources of the families and those that can be provided by the administration are often very limited and do not allow them to pay for long internships in a region other than their own and even less in another European country. On the other hand, teleworking could be combined with a short stay in the company in which the student is integrated into the work team in which he or she will carry out the internship and is trained in the methods he or she will use. There are very positive pilot experiences in this regard[9].

We highlight some ideas in relation to the methodology to be used in these practices:

Planning

The methodology proposed for face-to-face internships in the company that we have seen in section 4 is perfectly adapted to the work carried out remotely. The tutor in the company has continuous access to the document that the student is filling out and sees their progress both in terms of the progress of the project that has been proposed to them and the training in terms of content. Planning and monitoring the work plan is particularly important here.

Group work

This is a very interesting possibility, virtual internships open the door to group work in which students from different cities in the same country or in different countries in Europe participate. When working in this way, frequent group meetings can be planned by teleconference in which daily work is scheduled and the results are discussed. This work is very enriching for students in terms of the development of linguistic communication, teamwork, digital and effective oral and written expression tools and develops important formative aspects such as responsibility, setting specific objectives, temporal programming, intellectual honesty.

Digital tools

Digital skills are developed not only in terms of telematic communication but also in the exchange of digital information, security, management of information sources, data analysis software and process simulation.

Creativity

As in face-to-face internships, the formative nature of the work in the company depends a lot on the approach of the project or the activity that is proposed to the student, avoiding routine tasks. The educational center should pay special attention to this aspect when scheduling a dual training together with the company.



METHODS FOR COMBINING CLASSROOM TRAINING AND WORKPLACE TRAINING



The development of dual vocational training in accordance with the new legislation will make the student have a joint vision of the academic world and the world of work that is considered very positive for his or her training.

It is not only the fact that before graduation students already have a first work experience, but also that they have a perception that the teaching-learning process is approached in different ways in different areas.

At any level of academic education, curricula and teaching methodologies must be based on the idea that it is not possible to train a student in the full range of possible jobs that he or she may find in his or her professional life. Teaching cannot be training for a job. This is certainly true for university education, for example, it is not possible to train an industrial engineer in all the sectors to which he can dedicate himself throughout his life, nor a physicist or a philosopher.

But in the same way, even though a student can choose between 175 training cycles, it is not possible to think of preparing him or her exhaustively for all the possible jobs to which he or she can apply in each of the intermediate or higher level vocational training degrees. A super specialization in vocational training with teaching applied to each specific activity would greatly reduce the possibilities of career development of the graduate in vocational training.

Assuming this fact, training in the educational center must be directed to the fundamental aspects that allow them to quickly assimilate, in the future, everything necessary to join a job. Continuing with the examples of materials, what is the point of making a student memorize a list of commercial polymers with their chemical formulas, main physical properties, industrial applications and manufacturing processes? Rather, it will be necessary to teach them what crystallization and vitrification mean, what the softening point is, what chain structures can be found and what relationship exists between the structure, the processing and the properties of a polymer. When this student is in a company that processes a certain polymer, it will take him or her little time to study that particular polymer in depth and start performing his or her position in the company.





Good training will make them change their minds quickly, but it is true that school teachers should make an effort to show students that the knowledge and skills they acquire in their studies give them a great capability to learn new things.

In this sense, it is very valuable to confront students with exercises or challenges related to what has been explained in class, but different, so that they see themselves capable of looking for the information they lack, that they understand it and that they can make decisions.

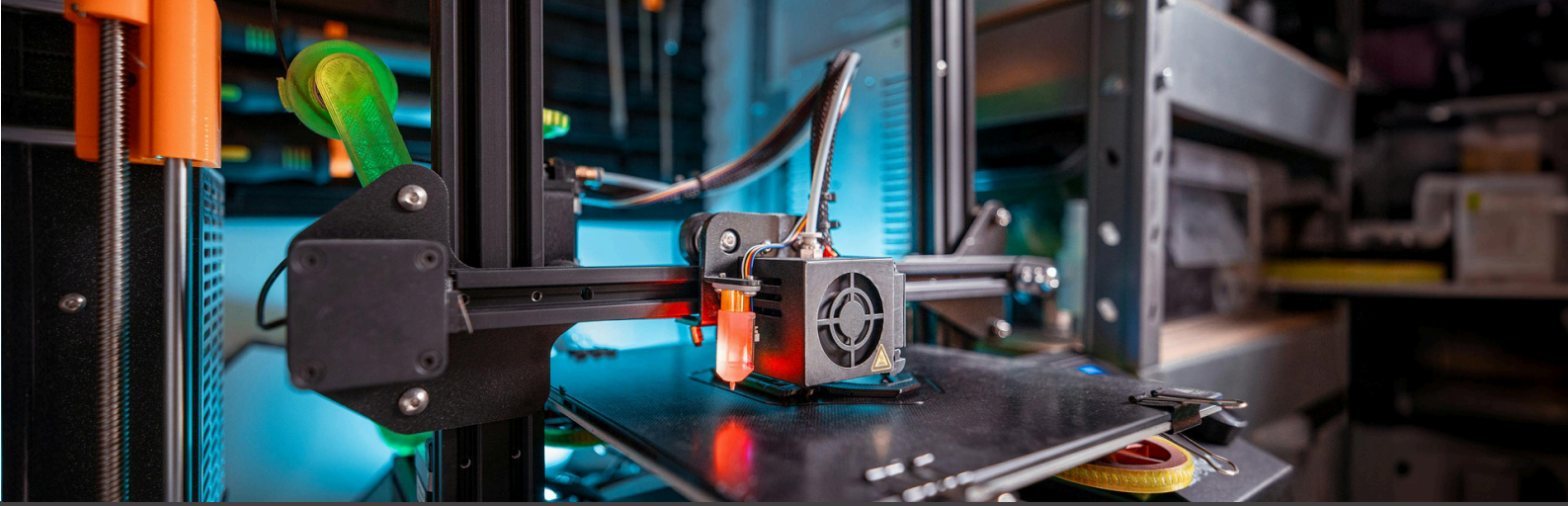
On the other side of dual training is the training period in the company. The company trains its workers to perform a specific job or several within the same activity or manufacturing process. Here, training in working methods, responsibility, teamwork, problem solving, is significantly different from the approaches that the student sees in the educational center.

Dual education aims to integrate both types of education. In the training periods in the company and in the educational center, the student will learn different things and carry out different activities. Not only that, the student will see that there are different ways of learning a subject. It is very interesting that company technicians are involved in the teaching of subjects of the degree that the student is studying because they will surely provide a different approach, they will highlight the importance of aspects that perhaps the teacher of the educational center would not have considered essential and they will also use different methodologies.

Of course, the teachers of the educational centers are knowledgeable about the business world in the field of their specialties and also the companies know to a greater or lesser extent the training that students receive in vocational training centers. The development of dual vocational training provided for in the new regulations will form a large network of relationships between educational centres and companies over time. The interaction between tutors from both worlds directly or through the students must increase mutual knowledge.

Some activities could be suggested to strengthen the integration between the teaching tasks of one and the other:

- A face-to-face meeting for the preparation of the student's personalized training plan.
- A visit by the tutor of the educational centre to the company during the training period of his or her student.
- A meeting between a student's tutors at the end of the course to evaluate the process.



ADAPTING TRAINING TO THE TECHNOLOGY SECTOR



The methodology that we propose for the training of the vocational training student in the company, based on the preparation of the programming notebook and monitoring of the training plan, can possibly be adapted to any business sector.

The fundamental pillars of the methodology is to help the student acquire basic autonomous learning skills and critical thinking tools. We consider that, in particular, they are key skills for a professional who wants to develop their career in technology-based companies.

If, in general, professionals must be prepared to be able to adapt to different jobs throughout their professional lives, due to the dynamics of companies and their own vital interests, in innovative companies professionals must be prepared for a continuous evolution of their activity. It can be very satisfying to feel able to contribute to the development of new technologies, new products or applications. Our approach is that the training that the vocational training student receives must provide him or her with the skills to do so and make him or her own appreciate that he or she has that ability.

In this sense, in the training period in the company we especially emphasize that the student/worker is not satisfied with carrying out activities that he or she does not understand.

We propose that they dedicate a part of their working time to searching for information, studying the concepts and processes involved in the tasks they perform and analyzing their results. These are training activities focused on specific concepts or technologies but that are easily extrapolated to other fields, which will help them develop the skills we talked about before.

This is one of the requirements for the success of our methodology, the student must have time of his or her working day to dedicate to thoroughly understanding what he or she is doing and be able to judge whether the results obtained are adequate or not and propose solutions, if applicable, to the problems that arise.

This approach can be extended to teaching in the educational center, we can show students that a study based on learning recipes or established protocols does not lead to acquiring the ability to do something new. In any of the subjects of the degree, we can propose exercises related to the contents of the subject but that confront students with a problem that is new to them. This means fighting against the first impression of "this has not been explained to me, so I can't do it", guiding them on the way to understand the problem and the principles that govern it (physical, mathematical, technological, economic, moral or philosophical) and making them feel capable of providing solutions.



The question always revolves around the same thing, a student of a vocational training cycle will get his or her degree, will start working in a company, after a while will change to another company in the same sector or a nearby sector, but with a different activity or will change jobs in the same company and after a certain time will change again.

With a 99% probability in each of these jobs, they will face something that will not have been explained to them in their educational center, or in the internship in the company or in previous jobs. This professional must feel capable of fully understanding the new activities in which he or she is going to be immersed, he or she must be convinced that he or she has the tools to contribute effectively to the objectives of his or her new position.

What is expressed in the previous paragraph can be applied in general to the career of any professional but especially to those interested in getting involved in technology companies with a strong innovation component.

In this sense, in the training period in the company we especially emphasize that the student/worker is not satisfied with carrying out activities that he or she does not understand.



THE VOCATIONAL TRAINING CENTRE AS A DRIVER OF INNOVATION



Vocational Training centres have the capability to support technological innovation and applied research through the development of projects that involve collaboration between the educational centre and companies and research centres.

The collaboration between both sectors (education and technology) not only allows the educational center to adapt the training needs of students focused on their employability, but also the implementation of active methodologies that allow students to acquire teamwork skills, entrepreneurship, and key skills for their access to the labor market.

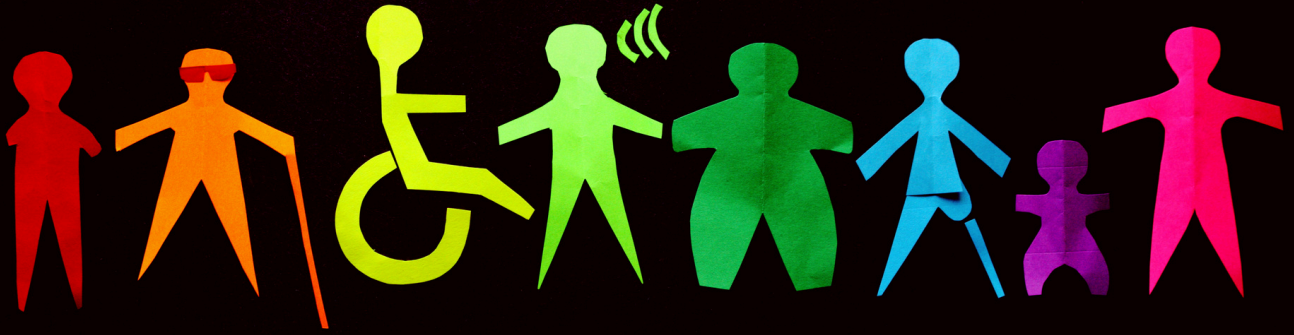
Article 211 of Royal Decree 659/2023, of 18 July, which develops the organisation of the Vocational Training System, establishes the bases for the development of innovation in vocational training.



With the new VET model, schools must include in their work plans projects that support applied innovation and research and that address training processes in:

- Technological innovation.
- Digital transformation.
- Immersive technology.
- Advanced learning methodologies.

To this end, the administrations will offer classrooms and technological resources to vocational training schools and will promote the development and implementation of projects that involve companies.



MECHANISMS TO PROMOTE THE LABOR INCLUSION OF STUDENTS



Education is revealed as a powerful mechanism for social inclusion, at least in part, through the greater employability of adults with levels of education above basic education

Figure 12 shows the employment rate of young people aged 25 to 34 in Spain. The employment rate is defined as the ratio between the employed population and the total population (the active population is the sum of the employed population and the unemployed population). Thus, according to data from the National System of Education Indicators 2024[10], while in this age segment only 45% of young people with primary education and below were employed, among those with studies in the second stage of secondary school, 70.9% were employed and among those with higher education, 82.7% worked. The definition of the levels of study in Figure 12 is in accordance with the 2014 classification of higher education (CNED 2014) of the National Institute of Statistics[11].

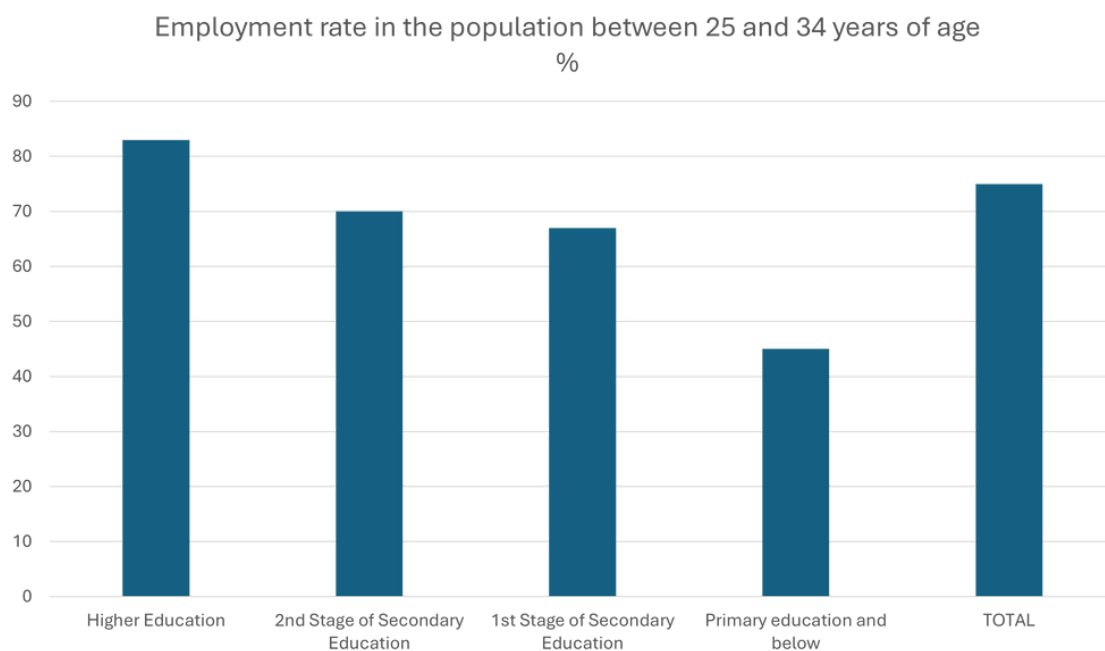


Figure 12. Employment rate in the population aged 25 to 34 according to the level of education, according to 2023 data[12]. Educational levels are defined according to the CNED 2014 classification[13].

Another very interesting aspect of the analysis of employability data is the role of education in reducing the differences between men and women, thus, while among men with primary education and below 54.3% were employed, only 32.9% of women with that level of education were, on the contrary the difference between men and women was from 75.5% to 56.0% at the level of education of the former secondary stage, from 74.1% to 67.2% in the second stage of secondary and the minimum difference was between the population of men, 85.1%, and women, 80.8% with higher education. This potential for reducing the gap between men and women is also reflected in the annual evolution of the indicators.

At the same time, the income level of employed young people correlates with their level of education and the differences increase over the years. Thus, taking as a reference a value of 100% for a worker with 2nd secondary education, in 2011 a worker with a higher level of education would have an income of 163% but in 2021 it would have 184% and at the opposite extreme, a worker with a level of education less than compulsory secondary education in 2011 would have an income of 78% but in 2021 it would be 66%.

The data show how the importance of educational attainment in both employability and income level is continuously increasing over the past decade. It is not uncommon for a person to need more training as society advances technologically to be considered valuable at work and to be rewarded with higher income. On the other hand, the gap between the average income of men and women narrows with the level of education. Although the average income of women with a higher education level in 2021 is still 17.5% lower than that of men with the same level of education, in the case of education levels below the 1st stage of secondary education, the gap increases to 35.7%.[14]

When we particularise vocational training, we find something similar. The levels of labour insertion, although they vary greatly depending on the professional families, show the growing importance of the level of education in the development of professional life. Statistical data show that the employability of a young person who only has basic studies clearly improves the incumbent in an intermediate or higher vocational training cycle and that graduates of certain higher level degrees have even better employability than university graduates.

Vocational training is a very important factor in social integration. In Spain, the percentage of young people with less than compulsory secondary education is 23.6%, but it is noteworthy that among foreigners residing in Spain it increases to 39.6%.[15] Low level of education is a risk factor for vulnerability and social exclusion.





There is a continuous increase in the enrolment rate of vulnerable populations in vocational training studies, especially in intermediate level studies. In addition, 2 out of 3 students who finish their basic vocational training studies continue studying.

Vocational training is characterised by the fact that it is possible to access the studies of the different levels of training from very different previous educational levels, even without having completed the compulsory basic studies, and this makes it an important means of labour and social integration. The basic and also intermediate training cycles act as a means of re-engaging students who have dropped out of secondary school or previous studies.



Despite all this, one of the problems that is revealed to be fundamental is the very high dropout rate. Less than 50% of students who enrol in Basic Vocational Training finish their studies after 4 years, a percentage that increases but only reaches 61.6% in intermediate vocational training and 73.8% in higher vocational training (2021 data for students enrolled in the 2017-2018 academic year) [16]. An in-depth analysis of the causes of early dropout from vocational training is beyond the profile of this work, but several factors can be mentioned that can contribute to student demotivation and dropout, including grade repetition, socio-economic reasons, lack of motivation, lack of commitment to education and others [17] [18] [19].

Dual training is expected to improve these figures. Currently, the number of students who have studied with the dual vocational training system is still low, only 3.7% of the total, but from the available statistical studies it can be deduced that students are more motivated towards education.

Thus, just over half of the students who completed intermediate vocational training enrolled in one of the following three years in a higher degree degree, which is 3.7% more than those who followed a non-dual training. However, the percentage of students in higher cycles who then enrolled in university studies was 23.5%, which is 2.7% less than those who took the non-dual modality, which could be due to the greater employability of those who took dual vocational training.

The study on the labour market insertion of graduates in Vocational Training education 2021 allows us to draw some conclusions about the employability of graduates in vocational training who have continued their studies in dual mode compared to those who followed the non-dual modality. The average affiliation rate in the period of analysis measures the proportion of individuals who are registered at some point in the period (it could be close to the concept of employed), it is used for this comparison in the report of the Economic and Social Council of Spain[20].

The average employment rate in the first year among graduates from the 2016-2017 and 2017-2018 graduating classes is in the order of 17.4 percentage points higher in the dual than in the non-dual training, in the middle level it is also higher in the dual modality 9.6 points above the non-dual modality.

After 4 years the differences have decreased somewhat but are still very relevant: 11.9 percentage points in the higher cycles and 7.5 points in the intermediate cycles. On the other hand, it is also shown that students who have followed the dual modality have a higher percentage of permanent contracts and a higher remuneration than those who have followed the non-dual modality[21].

The commitment of the new Vocational Training System to the generalization of the participation of companies in studies at all levels of vocational training has as its background the fight against youth unemployment that in Spain, as in the rest of the European Union, is in the order of twice the unemployment of the general population. The need to provide companies with qualified workers to face both the generational change and the great technification that is expected in the coming years with the digital, energy and ecological transitions must also play an important role in the planning of education.

From all this dataset, vocational training emerges as a powerful factor in the inclusion of young people in the labour market, but with the need to significantly improve students' commitment to education. There is no doubt that much remains to be done to convince our students that progress in acquiring learning tools leads to greater possibilities for more stable, better paid and more satisfying jobs for oneself. The collaboration between the educational center and the company can make an important contribution to progress in this regard.



A NEW MODEL REQUIRES NEW FIGURES: THE COMPANY'S TUTOR



The change that is intended to be promoted in dual vocational training, with its generalization to all students, is a challenge of great magnitude and requires qualitative changes.

The change that is intended to be promoted in dual vocational training, with its generalization to all students, is a challenge of great magnitude and requires qualitative changes. The number of students who have so far taken the dual modality is small compared to the total, 3.7% and the number of companies that have participated in its training, in the 2016-2017 academic year there were a total of 9916 companies. This number is only 0.3% of the total number of active companies and there is a greater participation of large companies compared to SMEs, contrary to the composition of the Spanish business fabric.

According to the INE's Central Directory of Companies (DIRCE) on 1 January 2024 there were a total of 3.25 million active companies in Spain, 99.9% of these companies are small and medium-sized with a number of workers between 0 and 249[22].

But discounting companies without employees, which account for 56.6% of the total, 90.1% of the rest are micro-enterprises with a workforce of between 1 and 9 workers. SMEs generate approximately 60% of jobs in Spain, while large companies generate 40%.



These numbers are relevant for the generalization of dual vocational training. The participation of a company in the training of a student has an economic cost for it both because of the bureaucratic management of the project itself and because of the time dedicated to the tutoring of the student and other expenses. On the other hand, it brings benefits both for the student's own work and for the generation of a pool of qualified workers that can be relevant in the case of expanding companies. The cost/benefit ratio is clearly favourable for large companies that may have vacancies to fill every year and that have staff capable of tutoring and experience in doing so, but it is hardly favourable in the case of micro-enterprises. This translates into a low participation of SMEs and in particular micro-enterprises in dual vocational training.

Another aspect worth taking into account is the unequal distribution of companies related to the different professional families among the different regions. There is a certain specialization of the regions in certain industrial sectors, which can mean that a student does not find a company in his or her environment that offers him or her a position for his or her internship that is interesting to him/her.



Clearly, it is necessary to develop methodologies for training periods in the company that make it more attractive for them to receive students. In this sense, one of the aspects in which action can be taken, and this is what we intend with our proposal, is to facilitate the tutoring of the student during their training in the company, providing work tools and some ideas to the company tutors. The collaboration with the tutor in the educational center will also contribute very positively.

As we have mentioned in previous sections, students must have both a tutor in the educational center and in the company in GRADES C, D and, where appropriate, E, as they are the grades that have a dual character. Article 61[23] of the new Law establishes the responsibilities of the dual guardian of an equivalent company or body.

In this sense, in each work centre there must be a dual tutor in charge of cooperation and coordination with the tutor of the Vocational Training educational centre. In this way, each student will have a tutor in the company during their training period in the company.

It should be noted that the administrations will guarantee the necessary training so that the company's tutors/trainers can carry out their functions.

The main responsibilities of the tutor of the company or equivalent body will be:

- 1** Identify the learning outcomes of the training plan to be carried out in the company. This responsibility will be carried out jointly with the tutor of the educational centre.
- 2** Participate in the assignment of the person to be trained in the company (directly or indirectly).
- 3** To welcome and tutor the student during the training period in the company.
- 4** Ensure that the training plan is executed.
- 5** Monitor and evaluate the acquisition of learning outcomes, in collaboration with the workers in charge of training students in the company.
- 6** Guarantee that the process of selection and training of students is carried out under equal conditions and opportunities.
- 7** Ensure that the student has adequate resources for his/her support and special needs.

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EVALUATION PROCESSES



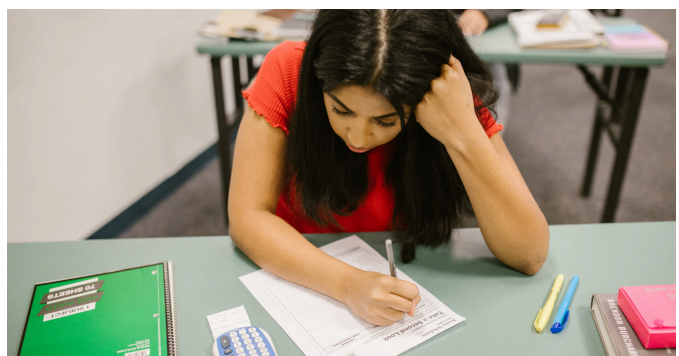
In the event that the student has special needs, they will be taken into account for their evaluation, respecting the methodological and curricular adaptations that have been necessary to guarantee the inclusion of the student.

The new law in its article 63[24] establishes that the final evaluation will be the responsibility of the educational center. To carry it out, it will take into account the monitoring and evaluation carried out by the tutor of the company or equivalent body.

However, although the responsibility for the evaluation falls on the educational center, the company's dual tutor may participate in the student's final evaluation, as well as participate in the evaluation meeting, if required.

In the event that the student has special needs, they will be taken into account for their evaluation, respecting the methodological and curricular adaptations that have been necessary to guarantee the inclusion of the student.

The training plan programming and monitoring notebook can be a very useful tool for the continuous evaluation of the student's progress. Within the framework of our methodology, the final evaluation should be consistent with the training objectives that have been set and assess aspects such as effective oral and written communication (for example, we could ask the student to explain the objective of the tasks performed in the company, or the operation of a team that has been used) his/her ability to obtain information about a given concept or about a technical piece of information (We can let him use a computer connected to the Internet and ask him to look for something specific and explain it), we can also ask him to explain some of the examples or questions that he has already filled in his notebook. In relation to the learning outcomes of the degree that the company has been responsible for, we would recommend asking questions of a general nature and not pretending that the student has memorized very specific aspects.





CONCLUSIONS

The new VET model, more inclusive and connected to in-company training, offers great opportunities to improve the training of students and their insertion in the labour market. However, one of the challenges it poses is to incorporate small and medium-sized enterprises, including micro-enterprises, into the new Vocational Training System. Developing methodologies for in-company training will be of great help to tutors and can be a factor that encourages small businesses to join the system. They would have to be flexible methodologies, to adapt to each sector and each job position to which the student joins, to the profile of the student himself and to the evolution he shows during his training. This is what we have tried to present with our proposal for a programme and monitoring notebook for the training plan. This methodology has a special impact on contributing to the acquisition by the student of autonomous learning and critical thinking tools for their entire professional career, but it is also aimed at learning outcomes specific to their degree.

On the other hand, the change also requires teachers and tutors to be more flexible, adaptable and collaborative with companies. The correct implementation of these changes will depend to a large extent on the school's ability to manage the transition in a planned and coordinated way. With the right tools, teachers will be able not only to adapt to the new model, but also to become key agents in the transformation of a new educational system that is increasingly looking towards a Dual Vocational Training model.



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Luis Gómez Estrada, was born in Valencia in 1980, with a Bachelor's degree in Industrial Design by "Universidad Politécnica de Valencia", experienced in the research field at the "Instituto de Biomecánica de Valencia" (UPV). Actually is CEO of Ikasia technologies and has experience as head of the 3D department in an engineering services companies. He has a broad experience in European and international project's management and coordination.



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Qualified as a VET Technician, Laura has been incorporated in Ikasia in 2018 in the scientific and educational project development team. Having exhibited organization and managing skills, has since been responsible for projects coordinated by Ikasia included in the Erasmus + Programme in the field of professional education. Laura is a easygoing, and hardworking person. Her diverse professional parkours led to the development of a broad range of skills, from organization to and interpersonal skills, which she transposes to her professional everyday life.



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Luis Martins is a Phd student at the Universitat Politècnica de València. After graduating applied biology from the Universidad e do Minho took a master in Biophysics and Bionanosystems on the same university. Additionally, has pedagogic competences and advanced english from Cambridge University and competences aided design, 3D printing and basic programming. Luis has experience in tutoring, orienting students projects or laboratorial internships.



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Silvia Randaccio has a degree in European and Extra-European languages, with a thesis in computational linguistics for the Arabic language. She currently follows numerous projects for the development of linguistic software, teaching materials, e-learning platforms and digital archives, for minority languages but also for other product sectors. She also manages digital marketing, SEO and web graphics.

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Jivago Nunes have a degree on Optoelectronics and Lasers, and a Master in Materials Engineering, and worked as a scientific researcher during 5 years. After that, he has been the CTO of the company Somatica, Materials and Solutions, Lda. for the last 10 years and, as an entrepreneur, he have created 5 companies during the last 7 years.



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Also, Manage and Organize Erasmus Plus Projects (KA1-KA2) and E-Twinning.



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Dimitrios Fligkos has studied IT in Athens University of Economics. He started his teaching career at 1st Epagelmatiko Lykeio Kato Achaia in 2002. He teaches IT and technology. Since 2002 he has taken part in many national and EU projects. He is responsible to organise students and teachers mobilities as well for the projects documentation. He has worked a lot to integrate ECVET system in the mobilities. He is also responsible to organise training activities for foreign students in the area. He has a key role to apply the mobility charter for vet high quality standards in projects planning and implementation.



Juan Tormos Capilla - IES Enrique Tierno Galván

VET teacher by the specialty of Electrotechnical Facilities since 1991. Tiene the linguistic training in foreign languages. He has participated as coordinator in three transnational projects, as well as in national innovation projects, linguistic immersion by the University of Paris, in the promotion of curricular enrichment and attention to students. He has held the position of deputy director of the IES, Head of Department, coordinator / tutor of FCT and member of several School Councils.



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José Juan Seijo Solaz - IES Enrique Tierno Galván

Industrial engineer. Teacher of Vocational Training in the branch of electricity. A sports and nature enthusiast, I am also passionate about new technologies.



ANNEX I

Programming and monitoring notebook of the training plan

Programming and monitoring notebook of the training plan

Student:

Educational center:

Technology company:

Training start date:

INTRODUCTION

This workbook includes the programming of the training period in the company and is considered a transcendental tool both to achieve the results of your training and to comply with the quality standards of the company's production processes.

In order to meet this objective, the notebook must be above all an aid to reflection both when programming a specific experimental task and for the study and understanding of concepts related to the expected learning outcomes, the search for bibliographic or technical information, the resolution of problems that arise at work or problems or questions of an academic nature. It must also facilitate the monitoring and evaluation of work and the acquisition of skills both specific to the training degree or specialization course or certificate of professionalism and transversal skills for the development of professional life.

We hope that the time and work necessary to complete the notebook will be compensated by the formative value and personal growth provided by reflection and in-depth analysis of the task at hand. To guide this reflection, the notebook is organized by sections or cells in which you must include all kinds of information for which certain indications are given in the cell itself. They are cells of different types, some examples are:

- Objectives of the student's activity in the company.
- Machine handling protocols.
- Results obtained from a given trial.
- Quality control results.
- Explain certain concepts related to the tasks undertaken.
- Solve problems or issues related to the expected learning outcomes and the tasks entrusted to them in the company.
- Search for technical information.
- Bibliographic searches

We consider especially valuable the exercise of understanding each of the aspects that have to be collected in the notebook, reflecting on them and writing the answers in your own words. In this sense, it should not be copied verbatim from any source for the preparation of the texts, nor is it allowed to include texts prepared with artificial intelligence or AI tools. The company reserves the right to analyze the notebook with plagiarism detectors or with detectors for the use of AI applications.

HOW TO COMPLETE THE NOTEBOOK

The schedule and tracking notebook is the property of the company, which will determine which parts of its contents must be kept confidential and which others you can make copies of for your personal use.

The workbook has five parts:

PART 1 contains the summary of the Training Plan agreed between the educational centre and the company, including the personal and contact details of the student and their tutors in the company and in the educational centre, and the learning outcomes for which the company is responsible and which must be developed during the training period in the company.

PART 2 briefly includes the job description, its objectives, the working hypotheses, the equipment to be used, etc. These cells, like all the rest of the notebook, must be filled in yourself. Your tutor in the company will explain all these aspects of the work and then you will be the one to write this description once you have made sure that you understand all the details, asking the necessary questions to the tutor himself or to other staff of the company.

We consider it essential, both for your training and for the work to be effective, that you delve into the scientific and technical principles on which the production processes in which you are going to be involved are based. PART 2 of this workbook also contains a series of questions, exercises or technical issues that want to guide you in this study and that you must answer or solve. To do this, you will have to look for information, organize it and understand it, your tutors will guide you on how to decide on the appropriate sources of information that sometimes will be notes of the subjects of the center itself, other books available in the educational center, in a library or in the company and in other cases internet pages or technical documentation of the company's teams. The issues are classified into three sections: some are more conceptual, others are related to technical characteristics and others refer to the treatment of data of physical magnitudes and their presentation in the form of graphs and tables.

PART 3 is the one in which the results of the experiments, or of the production or in general of the student's activity in the company are collected day by day.

PART 4 of the workbook deals with concepts and exercises related to the contents of the degree that we are going to cover during the stay in the company. Theoretical questions are posed, which try to help you understand the fundamental concepts of the subjects you are studying. You should look for bibliographic information on these concepts, understand it and write in your notebook the answer to the questions that are posed. You must write with your words, it is not useful to copy literally from a text on the internet or from a book, doing that you will not learn anything. There are also questions or problems that you must solve. You are asked for an analysis of the result you obtain, what reasons if that result is logical. Try not to leave an answer written in the notebook that has no head or tail. Of course you can consult the answers with your fellow students, with teachers, with colleagues in the company or your tutors, again, what is not worth is copying. This part of the workbook will also contribute to your evaluation at the end of the course.

In **PART 5** you are asked for your impression of your progress in acquiring the competences and learning outcomes expected in your training cycle. The questions that are raised have been drafted following the recommendations of the evaluation guides that are contained in the regulations that regulate your training cycle. That is, what those who prepared the curriculum expect you to understand or know how to do. It is interesting to look at these questions from time to time to see if you are making progress in these aspects with your study and your work in the company. If you see that any of these points is not sufficiently covered in the material you have or in the tasks you do, you can consult your tutors who will guide you with their explanations or give you complementary information to the one you have found or suggest other exercises. This will also help us to improve our teaching materials for classmates who come in successive years.

TEMPLATE

PART 1		TRAINING PLAN		
Course		Company		
Training degree/specialization course/professional certificate				
Student			Email:	Telephone
Training Center			Email:	
Tutor at the training center			Email:	Telephone
Tutor in the company			Email:	Telephone
Particular features				
In company training period		Calendar/Schedule/Period		
Total hours				
Learning outcomes in in-house training periods				
Professional Module	Code	Learning Outcomes	Activities	
		Lo1		
		Lo 2		
		Lo 3		
Signed: Tutor in the company		Signed: Student		Signed: Tutor at the training center

Learning outcomes in in-house training periods			
Professional Module	Code	Learning Outcomes	Activities
		Lo1	
		Lo 2	
		Lo 3	
		Lo 1	
		Lo 2	
		Lo 3	

Signed: Tutor in the company	Signed: Student	Signed: Tutor at the training center
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PART 2.- Workplace. Overview		
Task Title:	Folder/Server:	Date:
Short 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)

Include pages as needed

PART 2.- Workplace. Conceptual issues.

Explain the concepts clearly and concisely and solve the exercises collected in the following cells.

Question 1. Explain in 4 or 5 lines what you mean by...

Question 2. Why does it happen that...?

Question 3. How is xxxx different from yyyy?

Question 4. Mark the correct answer to the following questions among the 4 options that are posed:

.....	
<p>Bibliographic search: <i>Include in this cell the reference where you have studied these concepts, it can be a website or a chapter of a textbook or some notes from a subject of your training center.</i></p>	<p>Think and write very briefly how you have decided on one type of bibliographic source or another</p>

<p>PART 2.- Workplace. Technical Information.</p>
<p>Look for the following data or technical characteristics.</p>
<p>Question 1. Look for the value of</p>
<p>Question 2. Find a procedure to...</p>
<p>Question 3. Find a supplier for</p>
<p>Question 4. Mark the correct answer to the following questions among the 4 options that are posed:</p>

.....	
<p>Bibliographic search: <i>Include in this cell the reference where you have studied these concepts, it can be a website or a chapter of a textbook or some notes from a subject of your training center.</i></p>	<p>Think and write very briefly how you have decided on one type of bibliographic source or another</p>

<p>PART 2.- Workplace. Processing and storage and presentation of results.</p>
<p>Do the following exercises.</p>
<p>Exercise 1. Plot the following data...</p>
<p>Exercise 2. Perform the following operations on your server folders....</p>
<p>Exercise 3. Data operations.</p>
<p>Exercise 4. Mark the correct answer to the following questions among the 4 options that are posed:</p>

.....	
Bibliographic search: <i>Include in this cell the reference where you have studied these concepts, it can be a website or a chapter of a textbook or some notes from a subject of your training center.</i>	Think and write very briefly how you have decided on one type of bibliographic source or another

PART 3.- Activities. Task 01

(any tasks will be added as needed)

Task Title:

Folder/server *:

Date:

Short Description

The problem that arises.

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)

Include pages as needed

PART 3.- Results of task 01		
Title:	Folder/server :	Date:
<p>Additional information obtained during the performance of the task: Alternative test methodologies, sources in which to compare the data obtained, etc. Include the related files as annexes in the folder, indicating here the name or reference of the file.</p>		
<p>Experimental protocol (if there is already a written protocol in the company, simply indicate its reference, if not briefly detail the steps of the experimental procedure)</p>		

PART 3.- Results of task 01		
Title:	Folder/server *:	Date:
<p>Experimental results (if taken by hand or printed by the team, can be photocopied or scanned and copied here as an image. Videos, photographic images and other material will be added as attachments to the working folder, with the name or reference of the file here.)</p>		
<p>Add as many pages as needed, copying the entire table</p>		

PART 3.- Analysis of the results of task 01		
Title:	Folder/server *:	Date:
Assessment of the result: Assess the reproducibility of the trial, 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 supervisor or other team members		
Conclusions (here the solution to the problem posed must be proposed, but also detailed conclusions about the task itself, about the experimental procedure, suggestions for new tests, etc.)		

PART 4.- Training content

Explain the concepts clearly and concisely and solve the exercises collected in the following cells. The questions are sorted by topics related to the training outcomes we hope to achieve during your time at the company. Before you start writing, you'll need to look up information about the topic and study that information.

Topic 01 (Module xxxxxxxxxx learning outcome RA01)

Bibliographic search: *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.*

Think and write very briefly how you have 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 xxxx different from yyyy?

Conceptual question: Build a table with the following material properties....

Mark the correct answer to the following questions among the 4 options that are posed:

Problem: Calculate....

Characterization protocols: Look for the test standard... and briefly explains the shape and preparation of the test specimens and the magnitudes that are measured.

Technical Information Search: Find the value of..... (e.g., of the electrical conductivity of copper)

To program this part of the training plan, it is suggested to include one topic per learning outcome. The concepts and exercises admit enormous variability, the types of content of the question and exercise cells are just a few examples of the types of questions that can be raised.

PART 5.- Self-assessment

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 sufficient for you to master each of these aspects. Enter a comment to this effect in the box on the right.

Evaluation criterion CA1

CA2

CA3

.....

**Download the modifiable
training plan**



